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CHAPTER # 1

INTRODUCTION TO COMPUTER

"Short Questions and Answers"

Q1. Define Computer. Why computers are used?

Computer

In general computer is defined as a device which is used for calculation.

OR

A computer is a device which takes data as input, process the data and gives us the output in the form of information.

OR

Any data processing device is called computer.

Explanation:

The first use of the word "computer" was recorded in 1613, referring to a person who carried out calculations, or computations, and the word continued with the same meaning until the middle of the 20th century. From the end of the 19th century onwards, the word began to take on its more familiar meaning, describing a machine that carries out computations.

Example

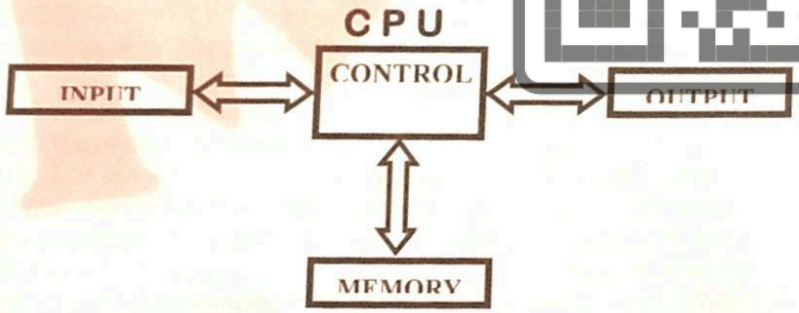
- Speedometer
- Thermometer
- Measuring equipment of petrol pump
- Calculator

Electronic Computer

An electronic computer Is defined as a device which is used for computation and it is based on digital mechanism

OR

A Digital Computer



An electronic device which takes data as input and gives output after digital processing

Example

- Micro Computers (PC)
- Mainframe Computers
- Super Computers

Q.2 What is computer science and information technology?

Computer Science

Computer science is a branch of electronics in which we study about the architecture, functions, programming and administration of a computer system.

➢ **Explanation**

In computer science we discuss about the hardware and software architecture. Computer functions and procedure are also discussed in computer science. A computer student may study to become hardware engineer or software programmer. Computer science is the study of computer namely, their design (architecture) and their uses for computations, data processing, and systems control. Computer science includes engineering activities such as the design of computers means hardware and software that make up the computer system.

Information Technology (IT)

The information technology is the emergence of two technologies that is computer science and communication technology.

➢ **Explanation**

When a computer is used for the communication it is called Information Technology (IT). The Information Technology provides comprehensive solutions for any business or technical organization. Information Technology provides various features like internet and other communication networks.

Q3. What type of device a computer is? And how it is used?

Definition

The term computer is derived from the word "compute" which means to calculate. So a computer is normally considered to be a calculating device that can perform arithmetic operation at enormous speed.

- ❖ **Computer** is a device that accepts input as data, process according to prescribed steps of instructions and provides the output of the processed information or data called result.
- ❖ **Computer** is a machine, which receives information, process it and present it in an arranged manner.
- ❖ **Computer** is a device which is capable of accepting data, applying described process to data and supplying results of their processes.
- ❖ **Computer** is known as an electronic computational device having internal storage, having a stored program of instructions and capability for modification of the set of instruction at any time.
- ❖ **Computer** is a machine that accepts data, processes it and gives output.
- ❖ **Computer** is an atomic electronic calculating device or machine that can perform logical and arithmetical operations.
- ❖ **Computer** is a fast and accurate electronic symbol manipulating system that is designed to automatically accept and store input data, process it and produce result (output) under the direction of a stored procedure.
- ❖ **Computer** is an electronic device which converts data/information into meaning full results or information.

Q4. What are the types of computer according to mechanism?

The computer systems have been divided into three main categories regarding their internal mechanism. Now we explain all the types one by one.

Analog Computers

Analog computers are the calculating or measuring devices which have physical mechanism for data processing.

➢ **Examples**

- Speedometer of a car
- Thermometer
- Analog Watch

Digital Computers

A digital computer is defined as an electronic device which is used for data processing. The data is processed digitally.

➢ **Examples**

- Micro Computers
- Mainframe Computers
- Super Computers

Hybrid Computers

A hybrid computer is defined as a computer which has both the characteristics of a digital and analog computers. It contains physical mechanism but process digitally.

➢ **Examples**

Modern Petrol Pump equipment

Q5. Define and explain computer system in short

Computer System

A system is a group of integrated parts that have the common purpose of achieving some objective(s). So, the following three characteristics are key to a system.

1. A system has more than one element.
2. All the elements of a system are logically related.
3. All the elements of a system are controlled in such a way that the system goal is achieved.

Since a computer is made up of integrated components (input and output devices, storage, CPU) that work together to perform the steps called for in the program being executed, it is a system. The input or output units cannot function until they receive signals from the CPU. The CPU alone is of no use. So the usefulness of each unit depends on other units and can be realized only when all units are put together (Integrated) to form a system.

"Long Questions and Answers"

Q1. Write a note on modern computer.

An electronic computer Is defined as a device which is used for computation and it is based on digital mechanism. OR

An electronic device which takes data as input and gives output after digital processing.

Example

- Micro Computers (PC)
- Mainframe Computers
- Super Computers

Modern Computer

Amodern computer is a programmablemachine designed to sequentially and automatically carry out a sequence of arithmetic or logical operations. The particular sequence of operations can be changed readily, allowing the computer to solve more than one kind of problem. Conventionally a computer consists of some form of memory for data storage, at least one element that carries out arithmetic and logic operations, and a sequencing and control element that can change the order of operations based on the information that is stored. Peripheral devices allow information to be entered from an external source, and allow the results of operations to be sent out.

Modern computers based on integrated circuits are millions to billions of times more capable than the early machines, and occupy a fraction of the space.Simple computers are small enough to fit into mobile devices, and mobile computers can be powered by small batteries. Personal computers in their various forms are icons of the Information Age and are what most people think of as "computers". However, the embedded computers found in many devices from mp3 players to fighter aircraft and from toys to industrial robots are the most numerous.

Q2. What are the types of computer according to mechanism?

The computer systems have been divided into three main categories regarding their internal mechanism. This division is based on the internal functionality of computer. The following are the three types of computers.

1. Analog Computers
2. Digital Computers
3. Hybrid Computers

Now we explain all the types one by one.

Analog Computers

Analog computers are the calculating or measuring devices which have physical mechanism for data processing.

➢ **Explanation**

An analog computer may be any kind of equipment used for the sake of calculation. An analog computer has got physical mechanism for data processing. If the equipment is run by the current then definitely analog current is used. An analog computer is a form of computer that uses the continuously-changeable aspects of physical phenomena such as electrical,[1]mechanical, or hydraulic quantities to model the problem being solved. In contrast, digital computers represent varying quantities incrementally, as their numerical values change. Mechanical analog computers were very important in gun fire control in World War II and the Korean War; they were made in significant numbers. In particular, development of transistors made electronic analog computers practical, and before digital computers had developed sufficiently, they were commonly used in science and industry.

➢ **Examples**

Speedometer of a car, Thermometer, Analog Watch

Digital Computers

A digital computer is defined as an electronic device which is used for data processing. The data is processed digitally.

➢ **Explanation**

The digital computers do not contain any physical mechanism. These are run by the digital current. The data is presented in the form of digital numbers which are called Binary Numbers (0, 1). The data processing is done through ICs, Transistors and processors electronically. Digital computers based on integrated circuits are millions to billions of times more capable than the early machines, and occupy a fraction of the space. Simple computers are small enough to fit into mobile devices, and mobile computers can be powered by small batteries. Personal computers in their various forms are icons of the Information Age and are what most people think of as "computers". However, the embedded computers found in many devices from mp3 players to fighter aircraft and from toys to industrial robots are the most numerous.

➢ **Examples**

Micro Computers, Mainframe Computers, Super Computers

Hybrid Computers

Characteristics of a digital and analog computers. It contains physical mechanism but process digitally.

➢ **Explanation**

A hybrid computer contains both types of characteristics. Although the processing is digital but internally it contains physical mechanism for other measuring functions. A hybrid computer contains digital or analog current accordingly for physical functions and data processing.

➢ **Examples**

Modern Petrol Pump equipment

Q3. What are the characteristics of the computer system? Describe briefly.

A Computer System is a modern problem solving machine. It contains a number of features which makes it a special device. The following are some important characteristics of a computer system.

1. **Extra-Ordinary Speed**

A computer is very fast device. It can process millions of instructions in a second. As compared to a human being it can perform calculations and logical decisions thousands of time earlier. A computer system's speed is measures in Hertz (Hz).

2. **Highly Reliable Accuracy**

The processing done by a computer system is highly reliable. The degree of accuracy of the calculated results cannot be challenged. Although the accuracy depends on the size of the calculation and the speed of a processor but the human being can never perform huge calculation with 100% accuracy.

3. Diligence And Smart Behavior

Unlike human being the computer system cannot be tired after working for a long time. It is free from lack of concentration, mental weakness, tiredness and sickness. A computer system can work non-stop for long time, performing calculations without committing mistakes and taking decisions without any error. If ten million calculations have to be performed, a computer will perform the ten millionth calculation with exactly the same accuracy and speed as the first one.

4. Versatility And Multiple Role Behavior

A computer system can perform any kind of task of processing. It can be used to solve any kind of problem. A computer system is used not only for business and technical problems but also to solve general life problems and even for entertainment. It can be used in offices, in large enterprises and even inside the houses. So a computer is capable of performing almost all kinds of tasks assigned to it.

5. Strong Memory

A computer system possesses a highly strong memory. It can never forget facts and figures once provided to it. Unlike the human beings a computer system is able to remember for unlimited time. A computer can forget any data if and only if it is instructed to do so. It is a great quality of a computer system that it contains a highly strong memory.

6. No Quality Of IQ

A computer system is supposed to do all kind of operations as these are programmed. A computer system cannot take decisions by itself. Its decision making skill is purely based on our instructions. Its IQ level is zero, so it cannot take its own decisions.

7. No Quality Of Feelings And Emotions

Unlike the human beings a computer system does not have feelings and emotions. Due to this quality the computer system always perform right logical decisions. It cannot make judgment using feelings and emotions.

Q4. What are the main concerns or parts and parcels for a computer system?

The computer system is not only a device. It cannot work efficiently if its concerns are not working properly. A complete computer system consists of five parts.

1. Hardware
2. Software
3. Data
4. Procedure
5. People

These all concerns are integrated with each other to build a complete computer system.

1. Hardware

Hardware is the physical component of a computer system. In other words all the devices which are the parts of the machines are called Hardware.

➢ **Examples**

- Input and output devices like keyboard, mouse and monitor
- Processing devices like CPU etc

2. Software

The software are the non-physical components. These are stored logically on the storage media. In actual, the software's are the programs to communicate with the computer system to solve user's problems.

➢ **Examples**

- System Software like operating system
- Application Software like a word processor

3. Data

The data is the plural of the word "Datum" which means facts and figures in the form of raw material. The data is the basic component on which user want to perform processing. The processed data is called

"Information". So the data is the main ingredient which is processed by the computer system.

➢ **Examples**

- Data about all the customers of the bank
- Data about all the products of the medical company

4. Procedure

The procedure is defined as a set of rules to follow a computer related task. A user needs to have a comprehensive guide line to use a particular hardware or software and to process data. The procedures may be in the form of user manuals, help files, study tours or tutorials.

➢ **Examples**

- User Manuals
- Help Files

5. People/User

The persons who are going to use hardware and software to process data by following procedure are called People/User. The people may be computer operators or application designers or any other executive working on the computer.

➢ **Example**

- Computer operators
- System managers etc

CH 02

CHAPTER # 2
INPUT DEVICES
"Short Questions and Answers"

Q1. How do you define Input, Output and process?

Input
The procedure of providing data and entering commands to the computer system is called Input.

Output
The procedure of getting information from the computer system is called Output.

Process
The work done by the computer system on the data is called Process. In the processing the data is converted into information.

Q2. Define input device and describe its types.

Input Devices
In order to process data computer must have the ability to receive this data. The element of a computer system which enters the data into the computer is known as Input Device. The input devices translate given information into a form which computer can understand.
The following are the kinds of input devices.

- Keyboard Devices
- Non keyboard Devices

Q3. What are non keyboard or direct input devices? Mention names of the all types.

Direct entry means that data is not entered into the computer through a keyboard. Some common direct-entry devices are used to input data into computer are as follows.

1. Scanning Devices
- Bar-code reader
- Mark and character reader
- Image scanner
- Fax machine

2. Voice-input devices
- Mic

3. "Pointing" Devices.
- Mouse,
- Trackball,
- Joystick,
- Touch screen,
- Light pen,
- Digitizer,
- Pen-based computer

Q4. Explain voice input devices.
The device which enables computer system to get input for the sound is called voice input device.

Explanation
This input device is the latest innovation, which helps us, input data by actually talking to computer. This system requires a microphone, which takes the analog signals from voice and sends them to an analog to digital converter. This converter changes analog signal into digital signals, which are in the form of zeros and ones and called voice patterns.

Example
Microphone, mic

"Long Questions and Answers"

Q1. What are the input devices categories used by a computer system?

Input Devices
The hardware which is used to enter data or commands into the computer system is called input device.

Explanation
Data may be entered in the form of characters, numbers, images, voice or even in the video form. For all these types of input different types of input devices are available.

Types of input devices
The following are the main three types of Input Devices.

- Keyboard Devices
- Pointing Devices
- Scanning Devices

All these types have various categories of input devices which are as follows:

1. **Keyboard Devices**
   - Computer Keyboard
   - Touch tone Devices
   - Set top box
2. **Pointing Devices**
   - Mouse (Trackball, Pointing sticks, Touch Pads)
   - Light Pens
   - Digitizers
   - Pen Based Systems
3. **Scanning Devices**
   - Scanners
   - Audio Input Devices
   - Video Input Devices

Q2. What are Scanning devices? Describes its types.
Scanning devices use light-sensitive equipment to record data in the form of bar codes, optical marks, typewritten characters, or magnetic-ink symbols, or even just plain text or graphics. This data is then converted to electronic form that can be processed by the computer.

1. Bar-Code Reader

A bar code is data represented in the parallel lines of a universal coding scheme. Bar codes are read by bar-code readers. Bar-code readers are photo-electric scanners that read bar codes by means of reflected light. Two types of bar-code readers are hand-held and stationary:

- **Hand-Held:** Hand-held bar-code readers are flat stick-like scanning devices that analyze the bar codes and translate them into computer-process able data.
- **Stationary:** Stationary bar-code readers are built into a countertop as in the supermarket to analyze which products have been sold and which are not.

2. Mark And Character Reader

Mark and character reader use a light source to read special marks or character and convert the data to computer-process able form.
These include the following.

- **Optical Mark Recognition(OMR)** "reads" pencil or pen marks, made in pre-defined positions on paper forms as responses to questions or tick list prompts
- **Optical Character Recognition (OCR)** devices are designed to read sheets of paper, cards, Books or Journal tapes. It has ability to read marks, printed numerical, special characters, alphabets and hand written numerals and letters.
- **Magnetic-Ink Character Recognition(MICR)** device read pre-printed characters printed with special magnetic ink.

3. Image Scanner

This input device is just like a photo state machine. It can read sheet of paper cards, books, picture diagrams and other paper material and converts them into computer-process able form. The following are the several types of scanners.

- **Flatbed:** are Stationary scanners that hold the image document in place while the scanning mechanism passes over it. Flatbed scanners just like a photo state machine.
- **Sheet-Fed:** are Stationary scanners that use mechanical rollers to move the image document passes the scanning mechanism.
- **Hand-held:** scanner is movable scanners that require the scanning mechanism to be moved over the image document.

4. Fax Machine

The word fax stands for "facsimile". A fax machine is transmission machine, which can send or receive pictures and text over a telephone line. Fax machine may be of two sorts.

- **Dedicated Fax Machine:** Dedicated Fax machine do nothing except send and receive document over telephone lines. The messages are printed out on paper. There are the kinds of machine seen in many business.

➢ **Computers With Fax Modem:** A Fax modem is an electronic circuit board installed in a computer. People send fax messages of document input to their computers. Message can be displayed on the computer screen or printed out.

Q3. Describe pointing devices in detail.

A device with which you can control the movement of the pointer to select items on a display screen Called pointing devices. Pointing device include the following.

1. Mouse

Mouse is the most common input device, which allows the user to control a cursor on the monitor screen to manipulate data without complicated commands. It's also called a "Pointing Device".

2. Trackball

A track ball is a pointing device same as of mouse but is stationary and guided by the fingers instead of rolled on the desktop. Some computers have a built-in trackball. Track ball may also appear on the side of a computer keyboard.

3. Joystick

A joystick is usually used to play games on computer. It is a device that controls the movement of certain object on the screen. The buttons on the joystick allow the users to perform different actions depending on the nature of the program.

4. Touch screen

A touch screen is a special type of computer display screen that allows commands to be entered by the user's touching the screen. Labeled boxes on the screen display choices available to the user. Touch screens are generally used in the locations such as airports and hotels to display certain types of menu.

5. Light pen

The light pen consists of a light-sensitive pen like device that enters commands into a special display screen when the user touches the screen with the pen. It is actually needed for engineering designing, graphic designers, and drafting engineers.

Q4. What are the keyboard devices? Explain briefly.

The Keyboard devices are the hardware which is used to enter data in the form of characters and numbers. It is also used to enter commands. The following are the main categories of keyboard devices:

- Computer Keyboard
- Touch tone Devices
- Set top Box

Now we discuss these types in detail.

1. **Computer Keyboard**

The computer keyboards are the conventional keyboards. It has 101 keys normally. It contains the following categories of keys:

- Character Keys
- Function Keys
- Special Purpose Keys
- Numeric Keys
- Cursor Movement Keys

These keyboards are used normally with the micro computers and it is [illegible] available.

2. **Touch Tone Devices**

The touch tone devices are also called Push Button Devices which are used to send data to a computer system. A credit card machine is a touch tone device which is used to transfer amount by accessing a computer.

3. **Set Top Boxes**

These are the smart keyboards used to enter commands remotely in wirelessly to televisions, monitor screens and other devices. The remote control of television is a famous example which is used to change the channels.

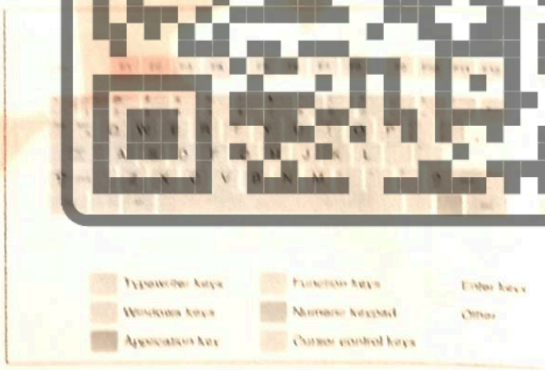
Q5. What are keyboard devices? Describe its functions and all kinds of keys in detail.

Keyboard Devices

Keyboard devices are those devices which enter the data in to computer by using keyboard.

Keyboard

Keyboard is a most common input device. Keyboard is used to enter commands and data input into a computer. It looks like a typewriter keyboard but has additional keys for specific purposes. Among IBM (International Business Machine) compatible computers, the most common keyboard layout is the IBM enhanced keyboard. The QWERTZ layout is widely used in Germany and much of Central Europe. The main difference between it and QWERTY is that Y and Z are swapped, and most special characters such as brackets are replaced by diacritical characters.



Control processor

Computer keyboards include control circuitry to convert key presses into key codes that the computer's electronics can understand. The key switches are connected via the printed circuit board in an electrical X-Y matrix where a voltage is provided

sequentially to the Y lines and, when a key is depressed, detected sequentially by scanning the X lines.

Keys of Keyboard

It has 101 keys arranged in following five groups.

1. Character keys
2. Function keys
3. Special-purpose keys
4. Numeric keys
5. Cursor-movement keys

1. Character Keys

This is the main part of Keyboard by using this keypad the letters a→z, A→Z, numbers 0→9 and special characters like,! @#$ %^&*()_+\|{}":>< etc. may be typed. Many of these characters are typed by holding Shift Key.

2. Function Keys

A set of twelve keys (marked as F1 to F12) is located at the top of keyboard. All of these keys have pre-defined meanings which depend on the application software.

3. Special-Purpose Keys

Some special functional keys are spread on keyboard like Ctrl (Control), Alt (Alternate), Esc (Escape), Home, PgUp, PgDn etc. special function keys are used to help enter and edit data and execute commands.

4. Numeric Keys

This part or pad is located on the right side of keyboard. When "NUM LOCK" key is pressed then the numbers on numeric keypad can be used to enter numeric data.

5. Cursor-Movement Keys

The cursor is the blinking symbol on the screen that shows where data may be entered next. The cursor movement keys, which are represented by directional arrow, move the cursor around the screen.

CH 03

CHAPTER # 3

OUTPUT DEVICES

"Short Questions and Answers"

Q1. Define output device. Write a short note on soft copy and hardcopy output?

Output devices convert machine-readable information into people-readable form. Output takes two forms:

- Softcopy output
- Hardcopy output

Softcopy

Softcopy means the output is in a form that cannot be physically touched, Softcopy output is best for information that needs to be viewed only occasionally or a few moments. The principal softcopy output devices are monitors and voice output devices.

Hardcopy

Hardcopy means the output is in a form that can be physically touched. The principal hardcopy output devices are printers, plotters, and microfilm output devices.

Q2. What is computer output microfilm/microfiche (COM) system?

(COM) is computer output produced as very small images on rolls or sheets of film. When the output is on rolls (usually 35 mm), it is microfilm. When the output is on sheets (4x6 inches), it is microfiche.

The principal advantages of this technology are:

1. **Speed:** COM systems can easily handle output at a rate in excess of 30,000 lines per minute. This is about 50 percent faster than most large laser printers.
2. **Size:** The output is condensed in size (compared to hardcopy output) by a factor ranging from 20 to 100
3. **Cost:** The cost per page of printed material is less than that of regular hardcopy output methods.

Q3. Explain softcopy output hardware briefly.

Softcopy output devices are of two principal types.

- Monitor
- Sound output devices

1. Monitor

This is the most commonly used form of output device when a permanent record is not required. A monitor is a television-like device used to display text and graphics from a computer. The monitor is also referred as screen, video display terminal (VDT) console, and cathode-ray tube (CRT).

There are two main types of monitors:

- Cathode-ray tube (CRT) monitor
- Flat panel monitor

2. Sound Output Devices

Sound output devices produce music, special-effects, noises, or other sounds.

Q4. Define display unit and its major types shortly.

The display unit is the device which gives copy viewable output.

Explanation

Display unit is also referred as video display terminal (VDT) or monitor. It displays text and graphics and videos on the screen.

Types

- Cathode ray tube monitor
  - Monochrome Monitors
  - Color Monitors
- Flat panel display
  - LCD (Liquid crystal display)
  - ELD (Electroluminescent display)
  - GPD (Gas plasma display)

Q5. Define impact and non impact printers.

Impact Printers

These Noisy printers print images physically striking an inked ribbon against papers with a hammer-like mechanism. In this sense, impact printers resemble typewriter.

Impact printer can be grouped as

- Serial or Character Printers
- Line Printers

Non Impact Printers

This Kind of printer does not generate the kind of hammering noise that an impact printer does. Non impact printer produce high quality images which impact dot-matrix printer cannot.

Following are the some common types of non-impact printer.

Thermal Printer, Ink-Jet Printer, Laser Printer

- Thermal Printer
- Ink-jet Printer
- Laser Printer

"Long Questions and Answers"

Q1. What is flat panel display? How many types of flat panel display are there? Explain in detail.

Flat panel display technology is particularly useful for laptop computers, which are small enough to fit in a brief case and powered by a small battery built into the computer.

Types of flat panel display

There are three types of flat panel monitors:

1. LCD (Liquid crystal display)
2. ELD (Electroluminescent display)
3. GPD (Gas plasma display)

LCD (Liquid crystal display)

The LCD uses a clear liquid chemical trapped in tiny pockets between two pieces of glass. Each pocket of liquid is covered both front and back by very thin wires. When a small amount of current is applied to both wires, a chemical reaction turns the chemical a dark color. There by blocking light, the point of blocked light. The point of blocked light is the pixel.

The principal advantages of LCD are

1. Low power consumption
2. low cost
3. small size

The biggest disadvantages are;

1. LCDs do not emit light, as a result, the image has very little contrast.
2. The screen is very susceptible to glare, so the optimum viewing angle is very narrow.
3. The resolution is not as good as that a CRT.

Electroluminescent (EL) Display

The EL display uses a thin film of solid, specially treated material that glows in response to electric current. To form a pixel on the screen, current is sent to the intersection of the appropriate row and column; the combined voltages from the row and column, cause the screen to glow at that point. EL displays provide the very high image resolution and excellent graphics capabilities. Fuel-color EL displays are expected soon. A disadvantage of the technology is its cost.

Gas Plasma Display

The gas-plasma display uses a gas that emits light when it is electrically charged. This technology resembles that of a moon light bulb. Depending on the mixture of glasses, the color displayed ranges from orange to red.

The principal advantages of gas-plasma display are:

1. The images are much brighter than on a standard CRT.
2. The resolution is excellent.
3. The glare is not a significant problem.
4. The screen doesn't flicker like some CRTs.

The main disadvantages are

1. only a single color is available (reddish orange)
2. The technology is expensive
3. It uses a lot of power
4. It does not show sharp contrast.

Q2. What is hardcopy output hardware? Explain briefly.

The device which is used to produce hardcopy output is called hardcopy hardware. Hardcopy output devices are of three principal types.

- Printers
- Plotters
- Computer output microfilm/microfiche (COM)

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1. Printers

A device used for printing is known as "printer". It receives information from computer and prints it on the paper and the result of printer on paper is called the permanent copy or a "Hard Copy". Printers may be categorized according to the speed as low or high which are:-

- Impact Printers
- Non-Impact Printers

2. Plotters

A plotter is a special kind of output device. It is like a printer in that it produces images on paper, but it does so in a different way. Plotters are designed to produce large drawings or images, such as construction plans for buildings.

3. Computer output microfilm/microfiche (COM)

(COM) is computer output produced as very small images on rolls or sheets of film. When the output is on rolls (usually 35 mm), it is microfilm. When the output is on sheets (4x6 inches), it is microfiche.

The principal advantages of this technology are:

1. Speed: COM systems can easily handle output at a rate in excess of 30,000 lines per minute. This is about 50 percent faster than most large laser printers.

2. Size: The output is condensed in size (compared to hardcopy output) by a factor ranging from 20 to 100

3. Cost: The cost per page of printed material is less than that of regular hardcopy output methods.

Q3. Write a note on impact printers.

These Noisy printers print images physically striking an inked ribbon against papers with a hammer-like mechanism. In this sense, impact printers resemble typewriter.

Impact printer can be grouped as

- Serial or Character Printers
- Line Printers

1. Serial or Character Printers

Those printers which are capable to print only one character at a time called "Character Printers". These printers can print 10 to 600 characters per second and have only one printing head. Dot Matrix Printers & Daisy Wheel Printers are the examples of character printers.

- **Dot Matrix Printer**

Printer with only one head at a time one character prints and moves to next character position is called dot matrix printer. This character produced by an arrangement of tiny hammer like pins, which strike the ribbon against paper. These dots are arranged in a specified pattern to form characters. Dot Matrix printers can also prints drawings, graphics or pictures. It can print at a speed of 30 to 600 CPS (Characters per Second)

➢ **Daisy Wheel Printer**

In Daisy Wheel printer an electric motor spins a wheel and a print hammer strikes to produce image of character on paper. These printers cannot produce pictures drawing or graphic but print out is much better than Dot Matrix Printers.

2. Line Printer

A line printer can print an entire line at a time which normally covers 80 or 132 characters and for each character have a separate printing head .Normally it can print about 250 lines per minute. Drum & Chain Printersare the examples of line Printers.

➢ **Drum Printer**

A DRUM printer consists of a solid cylindrical drum that has embossed characters in bands on its upper surface. On printing position many bands contains all the possible characters. The drum rotates at a high speed and for each location a print hammer is located behind the paper.

➢ **Chain Printer**

In CHAINprinter each character links with chain which moves and for every position there is a printing hammer located behind paper. When the chain rotates the properly timed print hammers strike paper along with inked ribbon against the proper character on the chain as it passes.

Q4. Write a note on non-impact printers

This Kind of printer does not generate the kind of hammering noise that an impact printer does. Non impact printer produce high quality images which impact dot-matrix printer cannot.

Following are the some common types of non-impact printer:

Thermal Printer, Ink-Jet Printer, Laser Printer

1. Thermal Printer

A thermal printer creates images by using colored waxes and heat in the pins of the print head to burn dots onto special paper. Thermal printers can provide the highest-quality desktop color printing available. However, they are expensive and require expensive paper.

2. Ink-jet Printer

An ink-jet printer forms images by spraying tiny droplets of ink from jet nozzles onto the paper. Ink-jet printers using multiple nozzles can print in several different colors of ink. Color ink-jet printers produce excellent graphics.

3. Laser Printer

These QUIET printers produce high quality printing and normally known as LASER (Light Amplification by stimulated Emission of Rays). HP 4L (Hewlett-Packard) is the example of laser printer. In these printers with the difference of electric charge laser exposed areas attract an ink powder called toner which is fused permanently on paper with heat or pressure. Only for 0.1-second heat fusing processes the temperature up to 200°c.

Q5. Define and explain terminals.

Terminals

A terminal is an input (and output) device that consists of a keyboard, display screen, and communications connection to a main frame computer system. Terminals are used for inputting data to and retrieving data from a remotely located main frame computer system.

There are three types of terminals:

- Dumb Terminals
- Smart Terminals
- Intelligent Terminal

1. Dumb terminals

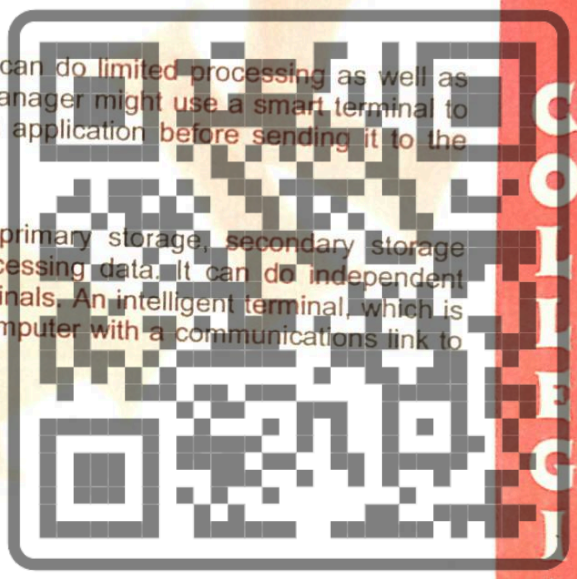
Dumb Terminals are used only for data entry and retrieval. They cannot process data independently. It is used only to gain access to information from a main frame computer system. An example might be a terminal used by an airline reservations clerk.

2. Smart Terminals

Smart terminal has some memory and hence can do limited processing as well as data entry and retrieval. A savings and loan manager might use a smart terminal to do simple computations on a customer's loan application before sending it to the company's mainframe computer.

3. Intelligent Terminal

Intelligent terminals include processing unit, primary storage, secondary storage such as magnetic disk, and software for processing data. It can do independent processing of their own, as well as act as terminals. An intelligent terminal, which is also called a workstation, is actually a microcomputer with a communications link to a mainframe.



CH 04

CHAPTER # 4

SYSTEM UNIT & PROCESSING DEVICES

OBJECTIVE:

When you have completed this chapter, you will be able to know about the system unit and processing devices

"SHORT ANSWER QUESTIONS"

Q1. Define system unit. What are the components in a system unit?
Q2. Define expansion cards and slots.
Q3. What is the purpose of ports? Explain its types.
Q4. What is meant by MIPS?
Q5. What's a Chip?

"LONG ANSWER QUESTIONS"

Q1. Define bus. What are various types of buses?
Q2. What is the purpose of the power supply unit?
Q3. What is the purpose of mother board? Describe
Q4. What are processing devices? Explain the structure and functions of Central Processing Unit.
Q5. Explain various features of the microprocessor.

"Short Questions and Answers"

Q1. Define system unit. What are the components in a system unit?

The machine of the computer system which holds all the processing and some storage devices is called system unit. The system unit contains the major components of the computer system which describes its configuration and defines the category of the computer system whether it is 386, 486, PI, PII, PIII, any other. The following are the components present in a system unit.

- Power supply
- Motherboard
  - C.P.U socket (Central processing Unit)
  - RAM slots (Random Access Memory)
  - BIOS chip (Basic Input Output Unit)
  - PCI slots (Peripheral Components Interface)
  - IO ports (Input Output)
  - IDE (Integrated Drive Electronics)
  - Buses. Etc.
- CD ROM
- FDD
- HDD

Q2. Define expansion cards and slots.

Expansion Cards and Slots

Expansion slots are sockets on the motherboard into which expansion card may be plugged. The slot connects the expansion card with the power supply and the buses for moving data and instruction.

Q3. What is the purpose of ports? Explain its types.

Ports are connecting sockets on the outside of the system unit. This allows you to plug in other devices, such as monitor, keyboard, modem or printer. Cables connected to the ports transmit streams of bits, such as those in an 8-bit ASCII character, to the outside devices.

Ports are of several types.

- **Serial Ports**

Serial ports are for connecting cables that transmit bits one after the other. Serial lines are used for connecting far-away devices, such as linking a modem to a telephone line.

- **Parallel Ports**

Parallel ports are for connecting cables that transmit several bits simultaneously. Parallel lines are used to connect devices located close by, such as a printer. Sending eight or so bits simultaneously transmits theinformation faster than is possible in a serial line.

Q4. What is meant by MIPS?

MIPS stands for "millions of instructions per second" and is a rough measure of the performance of a CPU. Modern CPUs can do so many different things that MIPS ratings lose a lot of their meaning, but you can get a general sense of the relative power of the CPUs from this column.

In general, there is a relationship between clock speed and MIPS. The maximum clock speed is a function of the manufacturing process and delays within the chip. There is also a relationship between the number of transistors and MIPS. For example, the 8088 clocked at 5 MHz but only executed at 0.33 MIPS (about one instruction per 15 clock cycles). Modern processors can often execute at a rate of two instructions per clock cycle. That improvement is directly related to the number of transistors on the chip and will make more sense in the next section.

Q5. What's a Chip?

A chip is also called an integrated circuit. Generally it is a small, thin piece of silicon onto which the transistors making up the microprocessor have been etched. A chip might be as large as an inch on a side and can contain tens of millions of transistors. Simpler processors might consist of a few thousand transistors etched onto a chip just a few millimeters square.

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"Long Questions and Answers"

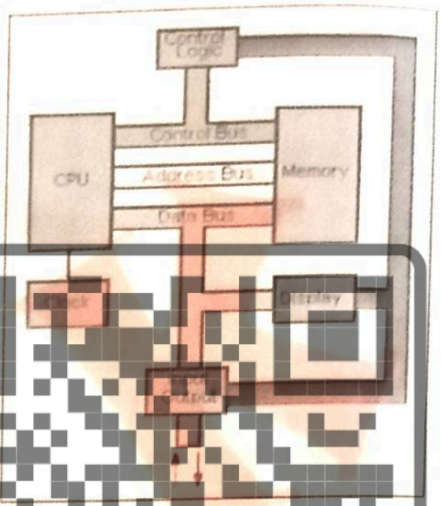
Q1. Define bus. What are various types of buses?

Buses

In Microcomputer, the input/Output devices and memories are connected to the microprocessor by means of wires called buses. In simple words, a bus is a communication pathway connecting two or more devices.

There are three types of buses called:

1. Address Buses
2. Data Buses
3. Control Buses



1. Address Buses

The address buses are used by the microcomputer to transmit the address of memory location which it wants to access for reading or writing purpose.

2. Data Buses

The data bus is used to transmit data from the memory to microprocessor. It may be used to transmit data to other devices such as output units. The data bus is bi-directional because data has to pass from microprocessor to memory as well as from memory to the microprocessor.

3. Control Buses

The Control bus supervises the reading or writing of data. It transmits signals to all the devices at the proper time. In fact, it informs the microprocessor that a particular unit has completed its job.

Q2. What is the purpose of the power supply unit?

The power supply unit is a device inside the system unit which converts Analog current into Digital current for the use of machine.

Explanation

All the devices inside the system unit need digital current to run. The current which is provided inside the homes and offices is analog current so it needs to be converted into digital current. Power supply provides current to various components of system unit according to requirements that may be 5-12 volts.

Structure and Function

Power supply contains an input socket for analog current of 220 volts. It contains an ATX (PI CONNECTOR) connector for mother board, same Molex connectors for hard disk and CD-ROMS and a mini-Molex connector for floppy drive. It also contains a P4 connector in Pentium 4 and above. Power supply unit is equipped with a fan which prevents it from heating problem.

Major Types of Power Supply

The following are the two types which are being used from a long time.

- AT Power supply
- ATX Power supply

The AT (Advance Technology) power supply was being used in a Pentium 1 and 2 and earlier system units but the ATX (Advance Technology Extended) is being used for Pentium 3 and onwards system units.

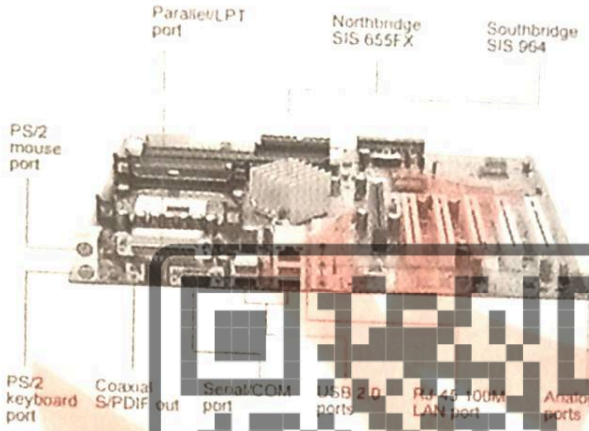
Q3. What is the purpose of mother board. Describe?

Definition

A mother board consists of flat circuit board in which all the devices are connected.

Explanation

Mother board is also called system board or main board of computer system. Mother board is a complex circuit board .All the input and output devices, storage and processing devices, IO cards and memory units are directly or indirectly connected to the mother board.



Components on the mother board

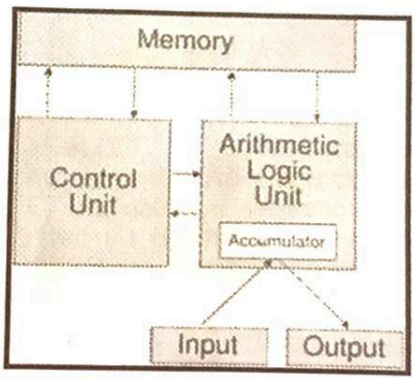
The following are the components on the mother board.

1. C.P.U socket (Central processing Unit)
2. RAM slots (Random Access Memory)
3. BIOS chip (Basic Input Output Unit)
4. PCI slots (Peripheral Components Interface)
5. IO ports (Input Output)
6. IDE (Integrated Drive Electronics)
7. Buses. Etc.

Q4. What are processing devices? Explain the structure and functions of Central Processing Unit.

Processing Devices

The processing hardware are the electronic circuits inside the System Unit (SU). There may be more than one processing devices in different components of the computer system. The processing devices are available on the mother board and on expansion cards.



Example

1. The Central Processing Unit on mother Board.
2. Processor of VGA Card.
3. Processor of Sound Card.

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Central Processing Unit

The main unit of the computer system located on the mother board is the central processing unit. It is an electronic chip, which is the brain of the computer system.

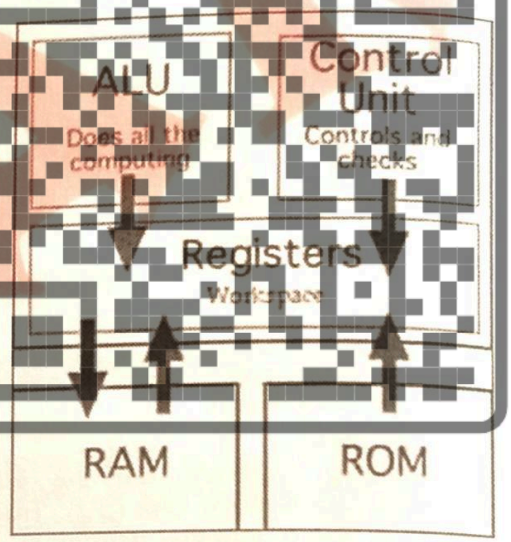
Explanation

CPU is the main processing device, which processes data and instructions and calculates the desired output. It controls all the operations of the computer system. It is a complex electronic circuit that manages all kinds of arithmetic and logical operations. The central processing unit (CPU) is the portion of a computer system that carries out the instructions of a computer program, and is the primary element carrying out the functions of the computer or other processing device. It carries out each instruction of the program in sequence, to perform the basic arithmetical, logical, and input/output operations of the system. In other words, the CPU is the "brains" of the computer. The term has been in use in the computer industry at least since the early 1960s. The form, design and implementation of CPUs have changed dramatically since the earliest examples, but their fundamental operation remains much the same.

Each motherboard will support only a specific type or range of CPU so that one has to check the motherboard manufacturer's specifications before attempting to replace or upgrade a CPU. Modern CPUs also have an attached heat sink and small fan that go directly on top of the CPU to help dissipate heat.

Construction of CPU

The basic unit of any processing chip is a transistor, which is an electronic switch and can represent the binary digits (0s and 1s). A transistor is composed of semi-conductor's PNP and NPN junction. Multiple Transistors construct on integrated circuit (IC). An IC is a basic processing unit and can make decisions by logic gates. Multiple ICs construct a micro-processor. A micro-processor is an advanced processing device.



Components Of CPU

The CPU contains three main components

1. Control Unit
2. Arithmetic Logic Unit
3. Cache Memory

Control Unit

The control unit is responsible for the execution of the programs. It not only controls the processes but also the IO interrupts. IO devices, memory units and storage media are controlled by the control unit. The flow of data and preferences of processing requests are handled by control unit. Its behavior is like a traffic police officer and it is responsible for flow of data.

Arithmetic And Logic Unit

The arithmetic and logic unit is responsible for the processing of data. The processing of data may be in the form of arithmetic operation like addition, subtraction, multiplication and division. The ALU is also able to take decisions on the basis of logics and conditions. Logical decisions means it can compare two values and can tell which one is greater.

Cache Memory

It is a temporary storage inside the CPU. It holds data which is being processed by the CPU. The cache memory is the fastest memory, it receives data from the main memory it holds the data until control unit directs it to provide data to ALU.

Q5. Explain various features of the microprocessor.

As computers have evolved, the size of the microprocessor has become smaller while its speed and capacity have increased tremendously. Indeed, the microprocessor, also called the CPU, is a tiny chip, about the size of your smallest fingernail, on which electronic circuitry has been etched. The chip is mounted on a piece of plastic, called carrier, with metal leafs attached to it. The microprocessor manages the computer processing and the transfer of data to and from primary storage, commonly called random access memory (RAM).

Some features of microprocessors are;

- Registers
- Bus
- Clock
- Coprocessor

1. Register

Registers are the temporary holding areas within the CPU for data and instructions that are to be processed immediately.

2. Bus

A bus is a kind of electronic pathway that connects parts of the CPU with each other and the CPU with other important devices. There are different types of buses (address bus, control bus, data bus)

3. Clock

The clock controls how fast all the operations within a CPU take place. While buying a microcomputer system, clock speed is an important measurement to know about. The clock speed, which expressed in (MHz) megahertz or (GHz) gigahertz, indicates how fast a computer processes information.

4. Coprocessor

Coprocessor is a part of microprocessor that is subordinate to the CPU and helps it handle data overload and speed up the computer's operations.

The best example of a coprocessor is that used for mathematical calculations.

CH 05

CHAPTER # 5

COMPUTER MEMORY& STORAGE DEVICES

OBJECTIVE:
When you have completed this chapter, you will be able to know about computer memory and storage devices

Short Answer Questions"

Q1. What is the basic unit of storage/ what are the other higher units of storage?
Q2. What do you understand by Read Only Memory?
Q3. What do you mean by Random Access Memory? Describe.
Q4. Define backup. Name the various backup storages devices?
Q5. Explain the construction and functions of floppy disks.
Q6. Write a note on CD-ROM disc and drive.
Q7. What do you know about virtual memory?

"Long Answer Questions"

Q1. What do you understand by Read Only Memory?
Q2. What do you mean by Random Access Memory? Describe.
Q3. Define backup. What are the various backup storages devices?
Q4. Explain the construction and functions of floppy disks.
Q5. Write a note on CD-ROM disc and drive.
Q6. Beside the ROM and RAM what are the other Forms of Memory?
Q7. What do you know about the magnetic storage explain the functions and structure of hard disk drive?

"Short Questions and Answers"

Q1. What is the basic unit of storage/ what are the other higher units of storage?

The Electronic computer is a digital device which is based on the binary digits 0 and 1. 0 and 1 are represented by low and high voltages of current. All the calculations are performed using binary digits. The storage is also in the form of 0 and 1.

Basic unit of storage: (bit)
A bit is the basic unit of storage which is represented by 0 or 1. 0 and 1 means low and high voltages of current.

Higher units of storage
To measure the large amount of data the higher units of a bit are used. The higher units are used according to requirement for memory and storage media the following are the higher units of storage.
4 bits = 1 Nibble
8 bits =1 Byte
1024 Bytes=1 Kilo Byte
1024 Kilo bytes=1 Mega Byte
1024 Mega bytes=1 Giga Byte

1024 Giga bytes=1 Tera Byte
1024 Tera bytes=1 Exa Byte

Unit conversion
Data can be represented in higher and lower units according to requirement to convert a lower unit value into higher unit value process of division is applied. To convert the higher unit into lower unit process of multiplication is applied.

For Example;
256 MB =? Bytes
256*1024*1024= 26843546 Bytes
16 Bytes=? Giga Byte
16/1024*1024*1024 = 1.49*10

Q2. What do you understand by Read Only Memory?
Read only Memory is a chip which contains permanently stored data. The contents inside the ROM cannot be changed by the users.

Explanation
The Read Only Memory is also called firmware means written program inside a chip. ROM is normally built in the mother board. A ROM chip with the name of BIOS (Basic Input Output System) is available on the mother board.

Function of BIOS
On Every Start-up of computer system the BIOS detects all the input ,output ,processing ,storage and other devices connected to computer. if there is any problem the BIOS informs about it using display or beeps.

Major types of ROM
The following are the main principle type of ROM.
- PROM (Programmable Read Only Memory).
- EPROM (Erasable Programmable Read Only Memory).
- EEPROM (Electronically Erasable Programmable Read Only Memory)

Q3. What do you mean by Random Access Memory? Describe.
Random Access Memory is the primary storage. It holds data temporarily. It means that it is a volatile memory. The data can reside in this memory until the current is provided to it.

Explanation
RAM consists of silicon chips in the form of the small circuit board attached on the mother board. The circuit board is called SIMM,DIMM or DDR plugged into the RAM socket. The data and instruction currently being processed are carried by RAM.

Types of RAM Chips
The following are the main RAM chip types:
1. DRAM (Dynamic Random Access Memory)
2. SRAM (Static Random Access Memory)
3. EDORAM (Extended Data Out Random Access Memory)

The above types are different from each other regarding their size, type and bus speed.

Q4. Define backup. Name the various backup storages devices?

Backup

Backup refers to making a copy of data or software to be used in case of failure.

Explanation

In all business and technical organizations, the data is life blood, data is the most expensive thing for the organization. Data is normally stored on the hard drives for different users, but there is a need of making a copy of data, so that it can be used in case of any technical or natural disaster. The process is called backing up data.

Backup devices

A device which is used to make backup for the current data is called backup storage device. The following are the backup devices used today:

Magnetic storage device

Floppy disks
Hard disks
Magnetic tapes

Optical storage devices

CD-R
CD-RW
DVD-R

Q5. Explain the construction and functions of floppy disks.

A floppy disk, also called a disk or diskette, is a removable storage disk used for storing data. The data on a floppy disk is recorded as magnetic spots. Magnetic spots are known as TRACKS. These tracks are formed as concentric circle on the surface of disk. Tracks are further divided into some sectors for better accessing of data. The disk is made of a special plastic (Mylar) coated with ferrous oxide.

Types of Floppy Disk and their Parts

The following Table shows the number of tracks and sectors on floppy disks of standard sizes and capacities used today.

FLOPPY DISK SIZE	SIDES	DISK CAPACITY	TRACKS PER SIDE	SECTORS PER TRACK
$5^{1/4}$ INCH	2	360 KB	40	9
$5^{1/4}$ INCH	2	1.2 MB	80	15
$3^{1/2}$ INCH	2	720 KB	80	9
$3^{1/2}$ INCH	2	1.44 MB	80	18
$3^{1/2}$ INCH	2	2.88 MB	80	36

Q6. Write a note on CD-ROM disc and drive.

CD-ROM Disc and CD-ROM Drive

CD-ROM, which stands for compact disk-read-only memory, is an optical-disk format that is used to hold prerecorded text, graphics, sound and videos. Data on disk is imprinted by the disk manufacturer and cannot be altered or erased by the user.

Read-only means that data can be retrieved but not altered or erased by the user. This type of optical disk is used to store huge volume of data that rarely change.

Q7. What do you know about virtual memory?

Virtual memory, or virtual storage, is a condition in which part of a program is stored on disk and is brought into memory only as needed. This feature, which requires special software, uses the disk as an extension of RAM. The virtual-memory program puts as many pieces of the program into RAM as possible. It runs them while putting the remaining pieces on disk, which are retrieved as appropriate.
For example, a microcomputer that has only 2 MB of RAM can run a 4 MB program (or even up to 1 GB) by using virtual memory.

"Long Questions and Answers"

Q1. What do you understand by Read Only Memory?

Read only Memory is a chip which contains permanently stored data. The contents inside the ROM cannot be changed by the users.

Explanation

The Read Only Memory is also called firmware means written program inside a chip. ROM is normally built in the mother board. A ROM chip with the name of BIOS (Basic Input Output System) is available on the mother board. Read-Only Memory or ROM is an integrated-circuit memory chip that contains configuration data. ROM is commonly called firmware because its programming is fully embedded into the ROM chip. As such, ROM is a hardware and software in one. Read-only memory (ROM) is a class of storage medium used in computers and other electronic devices. Data stored in ROM cannot be modified, or can be modified only slowly or with difficulty, so it is mainly used to distribute firmware (software that is very closely tied to specific hardware, and unlikely to need frequent updates).
In its strictest sense, ROM refers only to mask ROM (the oldest type of solid state ROM), which is fabricated with the desired data permanently stored in it, and thus can never be modified. Despite the simplicity, speed and economies of scale of mask ROM, field-programmability often make reprogrammable memories more flexible and inexpensive.

Function of BIOS

On Every Start-up of computer system the BIOS detects all the input ,output ,processing ,storage and other devices connected to computer. If there is any problem the BIOS informs about it using display or beeps.

Major Types Of ROM

The following are the main principle type of ROM.

- **Programmable Read-Only Memory** (PROM), or one-time programmable ROM (OTP), can be written to or programmed via a special device called a PROM programmer. Typically, this device uses high voltages to permanently destroy or create internal links within the chip. Consequently, a PROM can only be programmed once.

➢ **Erasable Programmable Read-Only Memory** (EPROM) can be erased by exposure to strong ultraviolet light (typically for 10 minutes or longer), then rewritten with a process that again needs higher than usual voltage applied.

➢ **Electrically Erasable Programmable Read-Only Memory** (EEPROM) is based on a similar semiconductor structure to EPROM, but allows its entire contents (or selected banks) to be electrically erased, then rewritten electrically, so that they need not be removed from the computer (or camera, MP3 player, etc.). Writing or flashing an EEPROM is much slower (milliseconds per bit) than reading from a ROM or writing to a RAM (nanoseconds in both cases).

Q2. What do you mean by Random Access Memory? Describe.

Random Access Memory is the primary storage. It holds data temporarily. It means that it is a volatile memory. The data can reside in this memory until the current is provided to it.

Explanation

RAM consists of silicon chips in the form of the small circuit board attached on the mother board. The circuit board is called SIMM,DIMM or DDR plugged into the RAM socket. The data and instruction currently being processed are carried by RAM.

Types of RAM Chips

The following are the main RAM chip types:

Dynamic RAM (DRAM)

DRAM is a classic form of RAM and has since been replaced by the faster and less expensive SDRAM. DRAM stores data electrically in a storage cell and refreshes the storage cell every few milliseconds.

Extended Data-Out RAM (EDO RAM)

EDO RAM is faster than DRAM. EDO RAM has also been replaced by SDRAM. EDO RAM is an improvement on DRAM because it has advanced timing features. EDO extends the amount of time data is stored and has a reduced refresh rate. This alleviates the CPU and RAM from timing constraints and improves performance.

Synchronous DRAM (SDRAM)

SDRAM replaced DRAM, and EDO. SDRAM is an improvement because it synchronizes data transfer between the CPU and memory. SDRAM allows the CPU to process data while another process is being queued. Figure shows an SDRAM.

Q3. Define backup. What are the various backup storages devices?

Backup

Backup refers to making a copy of data or software to be used in case of failure.

➢ **Explanation**

In all business and technical organizations, the data is life blood, data is the most expensive thing for the organization. Data is normally stored on the hard drives for different users, but there is a need of making a copy of data, so that it can be used in case of any technical or natural disaster. The process is called backing up data.

Backup devices

A device which is used to make backup for the current data is called backup storage device.

- **Explanation**

Various types of backup storage devices are used to take backup of the data. These are as follows:

Magnetic storage device

- Floppy disks
- Hard disks
- Magnetic tapes

Optical storage devices

- CD-R
- CD-RW
- DVD-R

Procedure of backing up data

For all the business and technical organization it is necessary to take backup of data periodically, means on monthly, weakly or daily bases. In most of the organizations a node (computer system) is installed as backup server in the local area network which uses large capacity hard drive to take backup.

Backup Software

A number of softwares are available in the market by different venders to take backup of data. Mostly backup softwares are building are built in the operating system being used.

Q4. Explain the construction and functions of floppy disks.

A floppy disk, also called a disk or diskette, is a removable storage disk used for storing data. The data on a floppy disk is recorded as magnetic spots. Magnetic spots are known as TRACKS. These tracks are formed as concentric circle on the surface of disk. Tracks are further divided into some sectors for better accessing of data. The disk is made of a special plastic (Mylar) coated with ferrous oxide.

Types of Floppy Disk and their Parts

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$3^{1/2}$ INCH	2	2.88 MB	80	36

- **Tracks**

Data is recorded in the form of magnetics are known as TRACKS. These tracks are formed as concentric circle on the surface of disk.

- **Sectors**

Each track on a disk is divided into pie-wedge-shaped sections known as sectors. These sectors are used by the computer system for storage reference purposes. Disks are identified as being either soft-sectored or hard-sectored.

➢ **Sides**

The early disks were either single-sided or double-sided. A single-sided stores data on one side only. A double-sided disk stores data on both sides. The standard 3½ inch floppy disks are double-sided, holding twice the data.

➢ **Densities**

Floppy disks may be double density, high density, or extra-high density. Density here means recording density, the number of bits per inch (bpi) of data that can be written onto the surface of a disk.

Q5. Write a note on CD-ROM disc and drive.

CD-ROM Disc and CD-ROM Drive

CD-ROM, which stands for compact disk-read-only memory, is an optical-disk format that is used to hold prerecorded text, graphics, sound and videos. Data on disk is imprinted by the disk manufacturer and cannot be altered or erased by the user. Read-only means that data can be retrieved but not altered or erased by the user. This type of optical disk is used to store huge volume of data that rarely change.

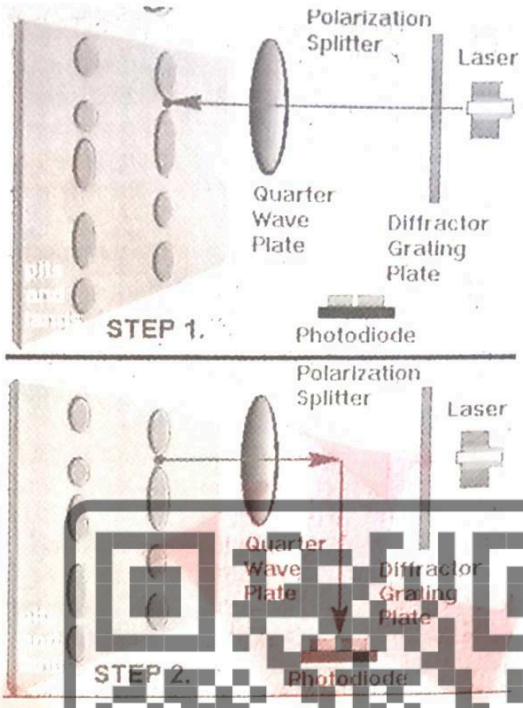
Media Disc construction

Optical media and magnetic media have some similarities and some differences.
Magnetic media are spelled with a "k", disk.
Optical media are spelled with a "c", disc.

➢ CD-ROM discs uselaser light and optical lenses to read information from the disc.
➢ A microscopic look will show you pits and lands. Pits are always the of same depth and width but varies in length.
➢ Magnetic disks rotate at a constant angular velocity, where as CD-ROM uses a method called constant linear velocity, that avoids the waste of storage space.
➢ CD-ROM discs have spiral tracks with sectors of equal length. To be able to read data on a CD, data must pass the read laser at a constant linear speed.
➢ For a 8x CD-ROM the required speed is 1.3 meters/sec. To accomplish this, the disc RPM must be adjusted continuously. The RPM of the disc changes from 500 RPM at the center to 200 RPM at the outer edge.
➢ By using a constant linear velocity method, a CD can contain more sectors and ultimately more data.
➢ A disc is 12 cm in diameter and slightly more than 1 cm in thickness.
➢ It is made of a clear polycarbonate, a thin layer of Aluminum and lacquer protective layer.

Reading Information from CD

A red laser, with a wavelength of 790 nanometers, is used in CD-ROM drives. Laser light has a single wavelength and coherent in phase (polarized).
The red light hits the land reflects back and reaches the photodiode by reflecting at 90 degree by the prism, where it creates higher voltages. Where as the pits scatter the light, some are reflected back but not in its full intensity, creates lower voltages in the photodiode.



Capacity of the CD

- 650 MB data or 74 min Audio = 464 floppy disks 3.5"
- Digitized information

Q6. Beside the ROM and RAM what are the other Forms of Memory?

The performance of microcomputer can be enhanced further by adding other forms of memory, as follows.

- **Cache Memory**

It is more expensive and faster than RAM but slower and less expensive than registers. It is used to increase the speed of processing by making current programs and data available to CPU at rapid rate. The general principle is to keep frequently accessed data in the faster cache while less frequently used items should be kept in RAM.

- **Virtual memory**

Virtual memory, or virtual storage, is a condition in which part of a program is stored on disk and is brought into memory only as needed.
This feature, which requires special software, uses the disk as an extension of RAM. The virtual-memory program puts as many pieces of the program into RAM as possible. It runs them while putting the remaining pieces on disk, which are retrieved as appropriate.
For example, a microcomputer that has only 2 MB of RAM can run a 4 MB program (or even up to 1 GB) by using virtual memory.

- **Video Memory**

Video memory or video RAM (VRAM) chips are used to store display images for the monitor. The amount of video memory determines how fast images appear and how

many colors are available. Video memory chips are particularly desirable if you are running programs that display a lot of graphics.

➢ **Flash Memory**

Flash memory, or flash RAM, cards consist of circuitry on credit-card-size cards that can be inserted into slots connected to the motherboard. Unlike standard RAM chips, flash memory is non-volatile. That is, it retains data even when the power is turned off. Flash memory can be used not only to simulate main memory but also to supplement or replace hard disk drives for permanent storage.

Q7. What do you know about the magnetic storage explain the functions and structure of hard disk drive?

Magnetic storage

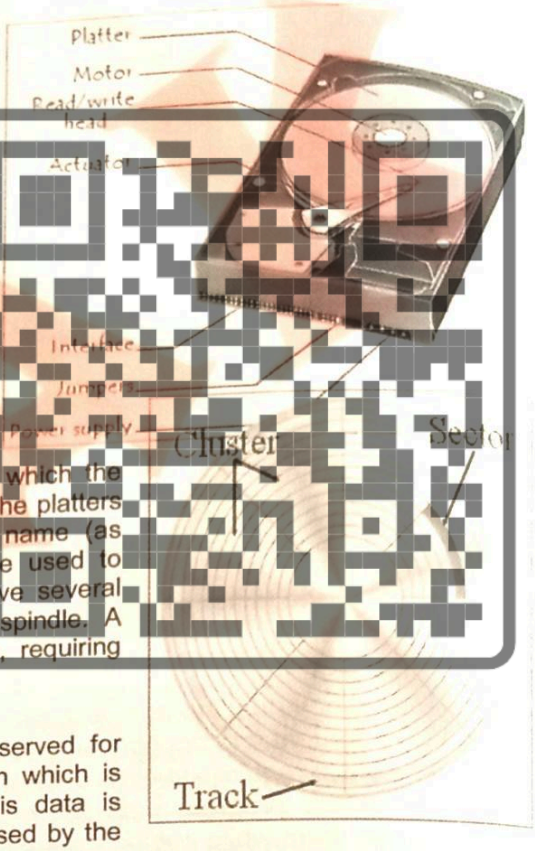
In magnetic storage data is stored on the platters having a coating of metal oxide. Reading and writing of data is done through electromagnetic mechanism.

Hard disk

A hard disk is a basic storage device which works on electro magnetic mechanism.

Explanation

In the hard disk storage media the disk and drive are integrated. Hard disk can store huge amount of data.



Structure

A hard disk consists of aluminum platters having metallic oxide coating. The platters can move around a spindle. A read-write head can read and write data in the form of bits. By formatting a hard drive sectors and tracks are created on the disk which makes it possible for reading and writing of data. A hard disk platter (or disk) is a component of a hard disk drive: it is the circular disk on which the magnetic data is stored. The rigid nature of the platters in a hard drive is what gives them their name (as opposed to the flexible materials which are used to make floppy disk). Hard drives typically have several platters which are mounted on the same spindle. A platter can store information on both sides, requiring two heads per platter.

Hard Disk Controller

One side of the first platter has space reserved for hardware-based track-positioning information which is not available to the operating system. This data is written to the disk during assembly and is used by the disk controller to position the drive heads correctly.

Motherboard Connectivity

A hard drive contains a power and data connector. A Molex connector of 12 volt DC provides current from power supply to hard drive. The data connectivity to the motherboard can be:

1. IDE (Integrated Drive Electronics)
2. EIDE (Enhanced Integrated Drive Electronics)
3. SATA (Serial Advanced Technology Attachments)

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CHAPTER # 6

SOFTWARE

OBJECTIVE:
When you have completed this chapter, you will be able to know about computer software

"SHORT ANSWER QUESTIONS"

Q1. Define software. What are the two main categories of software?
Q2. Define operating system. What are the famous Operating Systems used now a days?
Q3. Define operating Systems. What are the key functions of an operating system?
Q4. Write a short note on Microsoft Disk Operating System.
Q5. Write a short note on Microsoft Windows Operating System.
Q6. Write a short note on UNIX Operating System.
Q7. Define user interface. How many types of operating systems are there regarding user interface?
Q8. What do you know about boot up process?
Q9. Define computer language. Why computer languages are used? Give example.
Q10. Name the different generations of programming languages.
Q11. Define Language Translators. How many types of language translators are there?

"LONG ANSWER QUESTIONS"

Q1. Define Software. What are the major types of software? Mention software examples.
Q2. Explain Operating Systems. What are the key functions of an operating system?
Q3. Define Language Translators. How many types of language translators are there? Explain.
Q4. What are operating system types? Explain in detail.
Q5. Explain different generations of programming languages.

"Short Questions and Answers"

Q1. Define software. What are the two main categories of software?

Software
Set of information stored as interconnected programs to perform a specific task is called Software. **OR** The instruction set that tell the computer what to do is called software. **OR** Set of instruction that perform particular task is called software. The following are the two major types.

➢ **System Software**
System Software is a set of programs which is designed by the manufacture of computer. These programs are developed for efficient management of hardware.

They improve the functional capabilities of the computer and assist the user to solve their problems easily. Operating systems, antivirus, disk managers etc are the examples of system software.

➢ **Application Software**

Application Software is a collection of programs which are written by the users themselves to solve their problem. These programs are written in computer language such as FORTRAN, Basic, C Language and Pascal. Ms-Word, Ms-Power Point are the examples of application software.

Q2. Define operating system. What are the famous Operating Systems used now a days?

An Operating system is a master control program of a computer system which manages the overall performance of the computer system. A number of operating systems have been introduced by world famous software companies.

Example

The following are the operating systems which are being used worldwide.

- MS-DOS
- MS-Windows
- Red Hat Linux
- Novel Netware
- Unix

Q3. Define operating Systems. What are the key functions of an operating system?

Operating System

An operating system consists of master programs that manage the basic computer operations and resources.

Explanation

An operating system is system software. It contains a number of programs to manage system resources. A user cannot communicate to the microprocessor of computer system until an operating system is not installed. Windows XP, DOS, Linux, Unix are the examples of famous operating systems used today.

Operating System Functions

An Operating system performs a number of functions. The major functions of an operating system are as follows:

- ➢ Booting the Computer System
- ➢ Managing Storage Media
- ➢ Providing User Interface
- ➢ Managing Files
- ➢ Managing Computer Resources

Q4. Write a short note on Microsoft Disk Operating System.

DOS (Disk Operating System) is a command line operating system of the famous software company Microsoft.

Explanation

DOS has been a prominent and dominating operating system during 1980s and early 1990s. It is a single user, single tasking operating system used for micro computers. IBM's disk operating system is called PC-DOS.

MS-DOS Commands

DOS has a number of commands which are executed by typing at command prompt. The following are some basic commands.

COMMANDS	PURPOSE
CLS	To clear the screen.
COPY	To copy a file.
DEL	To delete a file.
DISKCOPY	To copy all files from one disk to another.

MS-DOS was introduced by Microsoft and PC-DOS was introduced by IBM. MS-DOS is still being used for the administration of Local Area Networks.

Q5. Write a short note on Microsoft Windows Operating System.

MS-Windows is a GUI based multi-tasking operating system launched by Microsoft.

Explanation

Windows operating system was developed by Microsoft Corporation in 1985. It has a graphical user interface. In 1990 Microsoft introduced windows 3.0 as an improved version of previous windows. In 1995 Microsoft introduced Windows 95 with more features and enhanced capabilities.

Advanced Versions of Windows

Microsoft has evolved windows with more advancement with the passage of time.

- Windows 95, Windows 98, Windows XP, Windows 7, Windows 8
- Windows NT (Client and Server)
- Windows 2000 (Client and Server)
- Windows 2003 (Client and Server)
- Windows 2008 Advanced Server

Q6. Write a short note on UNIX Operating System.

UNIX operating system was first developed by Bell laboratories, USA in 1969.

Explanation

UNIX was developed for the mini and micro computers. UNIX has a number of impressive features. It is a complete multi-tasking, multi-user, time sharing operating system written in mostly in C-language. It is also considered a better operating system for main frame computers.

Q7. Define user interface. How many types of operating systems are there regarding user interface?

An operating system user interface provides environment for the user to communicate with the computer system.

Types of User Interfaces

There are two major types of user interfaces provided by different operating systems

- **Command Line Interface**

A command line interface is a text based user interface. User has to type the commands on command prompt. In this interface user has to memorize commands. DOS is an example of command line operating system.

- **Graphical User Interface**

Graphical user interface provides a window like and menu like environment as user interface. Unlike the command line interface there is no need to type command. Commands can be given by selecting different options from the GUI environment. Commands can be given not only using keyboard but also using pointing devices. Windows is an example of GUI environment.

Q8. What do you know about boot up process?

Definition

The term booting refers to loading of operating system from secondary storage to main memory. Boating is done through a program called bootstrap loader. Boot-up process is performed on every startup of computer system.

Explanation

In computing, booting (also known as booting up) is a bootstrapping process that starts operating systems when the user turns on a computer system. A boot sequence is the initial set of operations that the computer performs when power is switched on. The boot loader typically loads the main operating system for the computer.

A successful boot is dependent on 3 conditions - the hardware, BIOS and operating system files to function without errors. When an error occurs, you will be notified by error messages, beeping sounds or in the worst scenario, a blank screen. The bootup process is a list of detailed procedures that the system undergoes to perform all system checks and load all necessary files to bring the computer to an operable state. The Windows XP bootup process comprises of the following procedures.

Q9. Define computer language. Why computer languages are used? Give example.

A computer language is a programming tool to develop programs. A computer language provides instructions for coding program modules. Integrated programs develop an application or system software.

Explanation

In order to facilitate the user, the computer programmer needs to develop software. For this purpose it necessary to have some programming tool. So the computer language is used to develop software.

Example

C, C++, Java, C#, VB are some examples of famous computer languages.

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Q10. Name the different generations of programming languages.

Programming languages have been classified into several programming language generations. Historically, this classification was used to indicate increasing power of programming styles. Later writers have somewhat redefined the meanings as distinctions previously seen as important became less significant to current practice.

- First Generation: -- Machine language
- Second Generation: -- Assembly language
- Third generation: -- High level language
- Fourth generation: -- Very high level language
- Fifth generation: --Natural language

Q11. Define Language Translators. How many types of language translators are there?

Language Translators

A program which translates the source code into machine language is called language translator.

Example

- C-Language Compiler
- Visual Basic Interpreter

Types of Language Translators

There are mainly two types of language translators. These are as follows:

Compiler

A compiler is a language translator which translates all the program instructions at once and gives output.

- **Example**
- C-Language Compiler
- CPP Compiler

Interpreter

An interpreter is a language translator which translates the programs instructions line by line.

- **Example**
- Visual Basic Interpreter
- Java Interpreter

"Long Questions and Answers"

Q1. Define Software. What are the major types of software? Mention software examples.

Software

Software is a collection of integrated programs, which are installed on computer system and used for different purposes.

Explanation

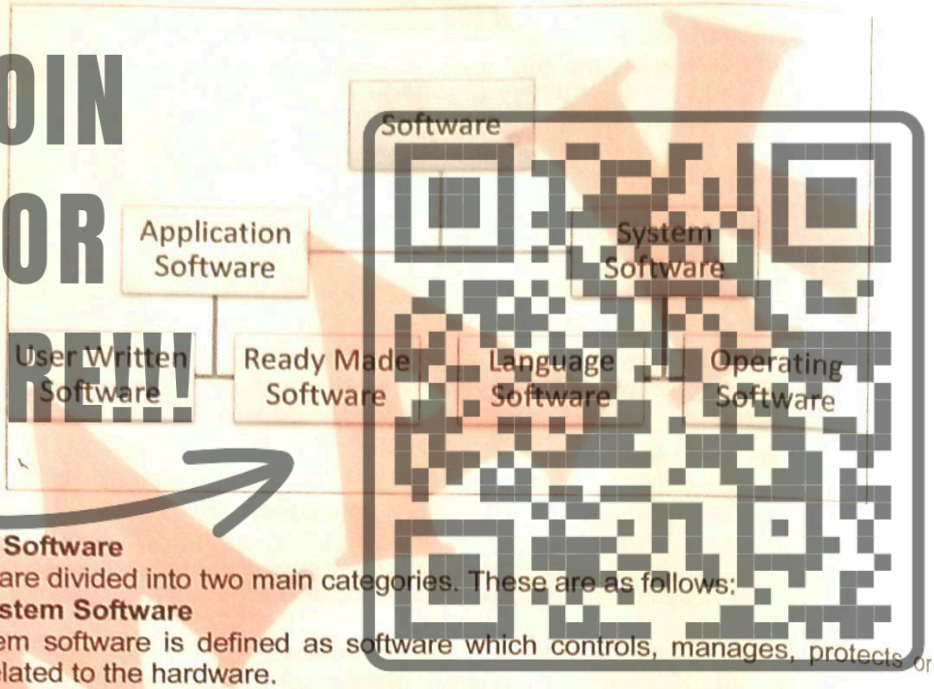
Computer software is defined as a set of programs and procedures that are intended to perform some tasks on a computer system. A software program is a set of instructions that are aimed at changing the state of computer hardware.

At the lowest level software is in a form of an assembly language, a set of instructions in a machine-understandable form. At the highest level, software is in a form of high-level languages, which are compiled or interpreted into machine language code.

Software is the logical components of computer system stored on storage media. These are developed using some computer languages. Software is used not only to control the computer system but also to perform the task required by the user.

Examples

- Ms-Word (A word processor)
- Windows XP (An Operating System)
- Internet Explorer (A Web Browser)
- Norton Antivirus (An Antivirus)



Types of Software

Software are divided into two main categories. These are as follows:

1- **System Software**

The system software is defined as software which controls, manages, protects or directly related to the hardware.

Explanation

System software is computer software designed to operate the computer hardware and to provide a platform for running application software. System software enables the hardware to work properly. User does not work directly on hardware, so the hardware management is done through the system software.

Example

- Windows XP (An Operating System)
- Norton (An Antivirus)
- Partition Magic (A Disk Manager)
- Sound Max Driver(A Device Driver)

2- Application Software

Application software is defined as software which facilitates a computer user to perform tasks to solve user problems.

Explanation

Application software, also known as an application has been designed to help the user to perform singular or multiple related specific tasks. Examples include enterprise software, accounting software, office suites, graphics software and media players. Many application programs deal principally with documents. Apps may be bundled with the computer and its system software, or may be published separately. Some users are satisfied with the bundled apps and need never install one. Application software is developed to solve user problems. A user problem may be any general, business, scientific or technical problem.

Example

- Corel Draw (A Graphics Designing Software)
- Peach Tree (An Accounting Software)
- Auto CAD (Civil Engineering Designing Software)
- Mozilla Firefox (A Web Browser)

Types of Application Software

The following are some types of application software.

➢ **Word Processing Software**

This software enables the users to create and edit documents. The most popular examples of this type of software are MS-Word, WordPad, Notepad and some other text editors.

➢ **Database Software**

Database is a structured collection of data. A computer database relies on database software to organize the data and enable the database users to achieve database operations. Database software allows the users to store and retrieve data from databases. Examples are Oracle, MS-Access, etc.

➢ **Spreadsheet Software**

Excel, Lotus 1-2-3 and Apple Numbers are some examples of spreadsheet software. Spreadsheet software allows users to perform calculations. They simulate paper worksheets by displaying multiple cells that make up a grid.

➢ **Multimedia Software**

They allow the users to create and play audio and video media. They are capable of playing media files. Audio converters, players, burners, video encoders and decoders are some forms of multimedia software. Examples of this type of software include Real Player and Media Player.

➢ **Presentation Software**

The software that is used to display information in the form of a slide show is known as presentation software. This type of software includes three functions, namely, editing that allows insertion and formatting of text, methods to include graphics in the text and a functionality of executing the slide shows. Microsoft PowerPoint is the best example of presentation software.

CH 06

MAK COLLEGIATE

Q2. Explain Operating Systems. What are the key functions of an operating system?

Operating System

An operating system consists of master programs that manage the basic computer operations and resources.

Explanation

An operating system is system software. It contains a number of programs to manage system resources. A user cannot communicate to the microprocessor of computer system until an operating system is not installed. An operating system improves the performance and efficiency of a computer system. An operating system (OS) is software, consisting of programs and data, that runs on computers, manages computer hardware resources, and provides common services for execution of various application software. The operating system is the most important type of system software in a computer system. Without an operating system, a user cannot run an application program on their computer, unless the application program is self booting.

Example

- Windows XP
- DOS
- Linux
- Unix

Operating System Functions

An Operating system performs a number of functions. The major functions of an operating system are as follows:

➢ **Booting the Computer System**

The term booting refers to loading of operating system from secondary storage to main memory. Boating is done through a program called bootstrap loader. Boot-up process is performed on every startup of computer system.

➢ **Managing Storage Media**

Storage devices like hard disks, CDs, floppy disks and other storage devices are formatted, initialized or prepared to read and write data by operating system. The file system on storage media is also managed by operating system.

➢ **Providing User Interface**

An Operating system provides a user interface to communicate user instructions to computer system. A user interface includes on-screen facilities for communication. A user interface may be a command like interface (CLI) like DOS and graphical user interface (GUI) like windows.

➢ **Managing Files**

An operating system provides commands to create and manage files on disks. The file operations like COPY, PASTE, DELETE, BACKUP, RENAME and etc are performed through operating system.

➢ **Managing Computer Resources**

An operating system manages all type of resources like CPU, Input and Output devices, memory units and all the peripheral devices connected to the computer system.

Q3. Define Language Translators. How many types of language translators are there? Explain.

Language Translators

A program which translates the source code into machine language is called language translator.

Explanation

In order to develop software, a programmer writes instructions in any computer language. The language code written by the programmer is called source code. It needs to be translated so that it can be understood by the CPU and this task is done by a program which is known as language translator.

Example

- C-Language Compiler
- Visual Basic Interpreter

Types of Language Translators

There are mainly two types of language translators. These are as follows:

Compiler

A compiler is a language translator which translates all the program instructions at once and gives output.

➢ **Explanation**

Some languages use the compiler to translate the source code program into machine language. The computer translates all the instructions at once and until and unless it does not print the result if there is no error found.

➢ **Example**

- C-Language Compiler
- CPP Compiler

Interpreter

An interpreter is a language translator which translates the programs instructions line by line.

➢ **Explanation**

Some languages use interpreter to translate the source code program into machine language. The interpreter translates the instructions one after another as these are written in the program. An instruction is executed if it does not contain any error and an instruction is not executed if it contains error.

➢ **Example**

- Visual Basic Interpreter
- Java Interpreter

Q4. What are operating system types? Explain in detail. (Each type can be asked as a short question)

The operating systems contribute to the simplification of the human interaction with the computer hardware. They are responsible for linking application programs with the hardware, thus achieving an easy user access to the computers.An operating system consists of master programs that manage the basic computer operations and resources. The following are the major kinds of operating system.

Real-time Operating System

It is a multitasking operating system that aims at executing real-time applications. Real-time operating systems often use specialized scheduling algorithms so that they can achieve a deterministic nature of behavior. The main object of real-time operating systems is their quick and predictable response to events. They either have an event-driven or a time-sharing design. An event-driven system switches between tasks based of their priorities while time-sharing operating systems switch tasks based on clock interrupts.

Multi-user and Single-user Operating Systems

The operating systems of this type allow a multiple users to access a computer system concurrently. Time-sharing system can be classified as multi-user systems as they enable a multiple user access to a computer through the sharing of time. Single-user operating systems, as opposed to a multi-user operating system, are usable by a single user at a time. Being able to have multiple accounts on a Windows operating system does not make it a multi-user system. Rather, only the network administrator is the real user. But for a Unix-like operating system, it is possible for two users to login at a time and this capability of the OS makes it a multi-user operating system.

Multi-tasking and Single-tasking Operating Systems

When a single program is allowed to run at a time, the system is grouped under a single-tasking system, while in case the operating system allows the execution of multiple tasks at one time, it is classified as a multi-tasking operating system. Multi-tasking can be of two types namely, pre-emptive or co-operative. In pre-emptive multitasking, the operating system slices the CPU time and dedicates one slot to each of the programs. Unix-like operating systems such as Solaris and Linux support pre-emptive multitasking. If you are aware of the multi-threading terminology, you can consider this type of multi-tasking as similar to interleaved multi-threading. Cooperative multitasking is achieved by relying on each process to give time to the other processes in a defined manner. This kind og multi-tasking is similar to the idea of block multi-threading in which one thread runs till it is blocked by some other event. MS Windows prior to Windows 95 used to support cooperative multitasking.

Distributed Operating System

An operating system that manages a group of independent computers and makes them appear to be a single computer is known as a distributed operating system. The development of networked computers that could be linked and communicate with each other, gave rise to distributed computing. Distributed computations are carried out on more than one machine. When computers in a group work in cooperation, they make a distributed system.

Embedded System

The operating systems designed for being used in embedded computer systems are known as embedded operating systems. They are designed to operate on small machines like PDAs with less autonomy. They are able to operate with a limited number of resources. They are very compact and extremely efficient by design. Windows CE, FreeBSD and Minix 3 are some examples of embedded operating systems.

Q5. Explain different generations of programming languages.

Programming languages have been classified into several programming language generations. Historically, this classification was used to indicate increasing power of programming styles. Later writers have somewhat redefined the meanings as distinctions previously seen as important became less significant to current practice.

- First Generation: ------ Machine language
- Second Generation: --- Assembly language
- Third generation: ----- High level language
- Fourth generation: -- Very high level language
- Fifth generation: ----Natural language

1. First Generation: Machine Language

A first-generation programming language is a machine-level programming language. It consists of 1s and 0s.

Originally, no translator was used to compile or assemble the first-generation language. The first-generation programming instructions were entered through the front panel switches of the computer system.

The main benefit of programming in a first-generation programming language is that the code a user writes can run very fast and efficiently, since it is directly executed by the CPU. However, machine language is somewhat more difficult to learn than higher generational programming languages, and it is far more difficult to edit if errors occur.

2. Second Generation: Assembly Language

Assembly Language is also known as second generation language. Assembly language is the low level languages. Assembly language is less complex to use than a machine language. Assembly language uses English word and symbols as abbreviation code to replace the 0s and 1s of machine language (A for "add" C for "compare" and MP for "Multiply"). A translator is required to convert the assembly language program into machine language that can executed by the computer. This translating program is called assembler. The assembler converted the assembly language into machine language.

3. Third generation: -- High level language

High level language is also known as third generation high level language. There languages use English text and mathematical formulas. The essential feature of third generation language is machine independence, meaning that the language can be used on different computers with little or change in performance or functionality. High level language is also knows as *problem oriented language* because the programming instructions are especially picked to be useful for solving particular type of problem. A language translator is required to convert a high level language program into machine language. Most common high level programming languages are: (BASIC, C-Language, COBOL, Pascal, and FORTRAN)

4. Fourth generation: -- Very high level language

Fourth generation language is a programming language designed with a specific purpose in mind, such as the development of commercial business software. These programming language are more powerful and specialized than existing high level language. Third generation language development method can be slow and error prone. All fourth generation language designed to reduce programming effort. Most common high level programming languages are: (FoxPro, C++, C#, JAVA and SQL (Structure Query Language).

5. Fifth generation: Natural Language

Fifth generation language is also called natural language. The natural language is similar to human language. These languages are designed to make the computer "smarter". Natural languages are part of the field of study known as artificial intelligence. Artificial intelligence (AI) is a group of related technologies that attempt to develop machine to emulate human-like qualities, such as learning, reasoning, communicating, seeing, and hearing.

- Status Registers
- Memory Buffer Registers
- Memory Address Registers
- Instruction Registers
- Program Counter
- Stack Pointer

Q3. Define instruction cycle.

Instruction Cycle

The processing required for a single instruction is called Instruction cycle. Here instruction cycle has been represented with diagram. It involves the following two steps.

➢ **Fetch Cycle**

The fetch cycle is that duration of time in which an instruction stored in the memory is brought to an appropriate register. All this happens under the commands from control unit of the CPU. The process of bringing an instruction from memory to a register is called a fetch cycle. It has to be completed in specified duration of time.

➢ **Execute Cycle**

The process of execution of an instruction by the CPU in a specified interval of time is called execute cycle. The instruction fetched from memory is placed in a register where it is decoded and executed by ALU in the execute cycle. The CPU when fetching an instruction is set to be in fetch stage and while executing an instruction is in execute stage. These two stages appear alternately.

Q4. Define Bus. How many types of buses are there? Explain in detail.

A bus is defined as the physical pathway for transmission of data and instructions in the central processing unit.

Types of Buses

The following are three types of buses:

Address Buses

The address bus is used by the microprocessor to transmit the address of the memory location which it wants to access for reading and writing purpose.

Data Bus

The data bus is used to transmit data from the memory to microprocessor and from microprocessor to memory. The data bus is also used to transmit data to other devices such as output units. The data bus is bidirectional because data has to pass from microprocessor to memory as well as from memory to the microprocessor. So the data is transmitted in both the directions.

Control Bus

The control bus controls the transmission of data. The control bus supervises the reading and writing of data. It transmits signals to all the devices at the proper time. It keeps informed the control unit about the status of a particular job or task.

CH 07

CHAPTER # 7
COMPUTER ARCHITECTURE

OBJECTIVE:

When you have completed this chapter, you will be able to know about the architecture of computer

"SHORT ANSWER QUESTIONS"

Q1. What are the major components of digital computers?
Q2. Define registers. Write names for various registers of CPU.
Q3. Define instruction cycle.
Q4. Define Bus. How many types of buses are there? Explain in detail.

"LONG ANSWER QUESTIONS"

Q1. Describe the major components of digital computers?
Q2. Define registers? Explain various registers of CPU.
Q3. Define Bus. How many types of buses are there? Explain in detail.
Q4. Describe fetch cycle or execute cycle inside the CPU.
Q5. Describe the procedure of execution of an instruction with diagram.

"Long Questions and Answers"

Q1. What are the major components of digital computers?

The computer system is a complex computing device. It involves some major components for the processing of data. There are the primary components and without these components the processing cycle cannot be completed.

Components Of Digital Computer:

The following are the components of a digital computer:

- Input Unit
- Output Unit
- Central Processing Unit
- Memory Unit

Q2. Define registers. Write names for various registers of CPU.

Registers

Registers are the temporary storage device which holds data and instructions until it is being processed or manipulated.

Explanation

Each register within the CPU performs a specific role. The registers help in the processing of data. The register's size and operations that take place in the register reflects the specific function that the register performs in the computer.

Types of Registers

Following are some types of registers:

- General Purpose Registers
- Accumulator

CH 07

"Long Questions and Answers"

Q1. Describe the major components of digital computers?

The computer system is a complex computing device. It involves some major components for the processing of data. There are the primary components and without these components the processing cycle cannot be completed.

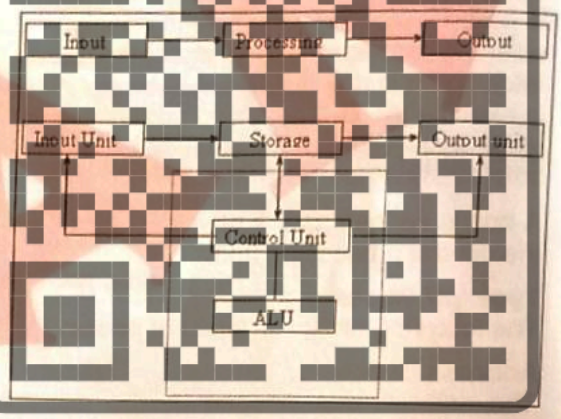
Components Of Digital Computer:
The following are the components of a digital computer:

- Input Unit
- Output Unit
- Central Processing Unit
- Memory Unit

Input Unit
Data and commands can be entered into computer system through input unit. The input unit provides an interface between the user and the machine.

Example
Keyboard is the most common example for the input unit. But data can be entered using various input devices and in many forms like audio, video and graphical.

Output Unit
The output unit receives information and data from the central processing unit for the user. It also provides an interface between machine and user. Digital data is converted into audio, visual and graphical form by the output device for the user.



Example
Monitor is the most common example for the output unit. Various devices are used for audio, video and graphical output.

Central Processing Unit
The Central Processing Unit is the brain of the computer system. It has two major sections, an ALU and Control Unit. It also contains several registers and a network of buses connecting various components. The CPU works with the co-ordination of memory unit to carry out the processing tasks.

Example
Now-a-days, a PGA shape processor is inserted into the ZIF socket on the motherboard.

Memory Unit
A volatile memory unit plays an important role for the processing of data. Memory unit is also called main memory. The following are the tasks assigned to the memory unit:

- To hold programs and data passed to the computer system for processing

- To hold the intermediate processing results
- To pass the process data and to hold output for the output unit.

Example
SIMM, DIMM and DDR chips of RAM are the examples of Memory unit.

Q2. Define registers? Explain various registers of CPU.

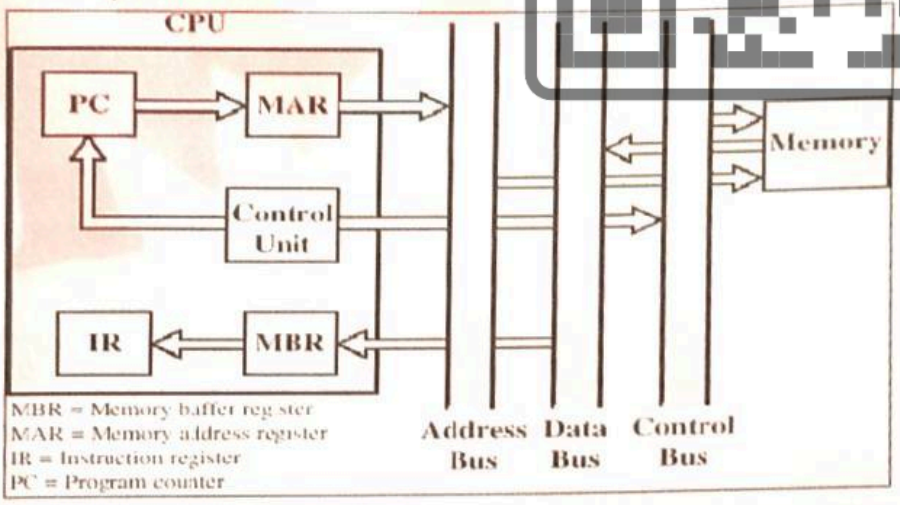
Registers
Registers are the temporary storage device which holds data and instructions until it is being processed or manipulated.

Explanation
Each register within the CPU performs a specific role. The registers help in the processing of data. The register's size and operations that take place in the register reflects the specific function that the register performs in the computer.

Types Of Registers
Following are some types of registers:

- General Purpose Registers
- Accumulator
- Status Registers
- Memory Buffer Registers
- Memory Address Registers
- Instruction Registers
- Program Counter
- Stack Pointer

General Purpose Registers
The general purpose registers may be used for temporarily storing data. These registers may be combined to form registers pairs in order to handle larger size data. These are also known as programmable registers as it may be programmed by the user with the help of instructions.



Accumulator
The register is generally referred to as register AC. It is used for storing data for doing arithmetic and logic operations. The result of arithmetic and logical operations is automatically stored in this register.

Status Register
The status register is also called flag register, holds 1 bit flag to indicate certain conditions that arise during arithmetic and logical operations. The important conditions shown by flag or status registers are:
CARRY : Indicates whether there is overflow or not
ZERO : Indicates whether the result is zero or non zero
SIGN: Indicates whether the result is plus or minus
PARITY: Indicates whether the result contains odd number of 1s or even number of 1s.

Memory Buffer Registers
This register is also known as the Memory Data Register(MDR). It is used to hold a word that is being stored to or retrieved from the memory location currently addressed by the memory address register.

Memory Address Registers
This register holds the address of a memory location of the word to be written from or read into the MBR.

Instruction Register
This is very important register. It holds the actual instructions being executed currently by the computer system.

Program Counter
This is a register which deals with the order for execution of instructions. This acts like a pointer which indicates the subsequent memory locations where instruction is stored. After one instruction is executed the program counter gets incremented by one to indicate the location of the next instruction in the serial order.

Stack Pointer
Stack may be defined as a set of memory locations and the stack pointer may be defined as the indicator to these memory locations. Stack memory locations are used by a microprocessor for storing data temporarily for execution of a program.

Q3. Define Bus. How many types of buses are there? Explain in detail.

A bus is defined as the physical pathway for transmission of data and instructions in the central processing unit.

Explanation
The microprocessor contains various buses to locate memory location to read and write data. The buses inside the microprocessor are called Internal Buses. A bus is a communication pathway connecting two or more devices. A bus is a shared transmission medium. Physically a bus is a wire through which electronic signals can be transmitted.

Types of Buses
The following are three types of buses:

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D-70 Block H North Nazimabad
Near Landi Kotal Chowrangi
Ph: 36640700-900

GULSHAN CAMPUS
GPC 3-4 Commercial Block 1
Gulshan Adj, to Post Office
Ph: 34801426-27

U.P. MORE CAMPUS
C-134, Sector 11 - B, North Karachi
Adj. to Programmer School
Ph: 36981875, 36933799

JOHAR CAMPUS
C - 56, Block 13, Gulistan-e-Johar
Opp. Dar-ul-Sehat, near Rado Bakery
Ph: 34611130-31

➢ **Address Buses**

The address bus is used by the microprocessor to transmit the address of the memory location which it wants to access for reading and writing purpose.

Example

The microprocessor wants to read the contents of a memory location at the address 2012. This address coded in binary form is transmitted to all the devices connected to the microprocessor by the address bus only and microprocessor locates the particular memory location. An address bus is unidirectional, means electronic signals are transmitted in one direction only from microprocessor to other devices.

➢ **Data Bus**

The data bus is used to transmit data from the memory to microprocessor and from microprocessor to memory. The data bus is also used to transmit data to other devices such as output units. The data bus is bidirectional because data has to pass from microprocessor to memory as well as from memory to the microprocessor. So the data is transmitted in both the directions.

➢ **Control Bus**

The control bus controls the transmission of data. The control bus supervises the reading and writing of data. It transmits signals to all the devices at the proper time. It keeps informed the control unit about the status of a particular job or task.

Q4. Explain internal working of CPU?

OR

Describe fetch cycle or execute cycle inside the CPU.

The microprocessor is a complex computing device. It is the heart of the computer.

Functions of CPU

The CPU is the main processing device inside the computer system. It accepts data and instructions, process the data according to the instructions and delivers the output to the output unit. The CPU controls and co-ordinates the activities of all the units of computer system.

Components of CPU:

The central processing unit contains the following components:

- Control Unit
- ALU
- Cache Memory
- CPU Registers
- Math Co-processors

All the above components work together for the processing of data.

Features of a Digital Computer

To understand the internal working of a computer system following features must be considered.

- The computer word is 16 bit long
- It accepts and executes one address instruction
- The instruction word is divided into two parts namely the operation code (Opcode) and address field which gives the address of the operant.
- The Opcode is 4 bit long and address field is 12 bit long

- The computer system has memory size of 4k words which means it has 4*1024=4096 memory locations which can be addressed.

Procedure of Instruction Processing

The execution of an instruction stored in memory involves two steps. The processor reads instructions from memory on at a time and executes each instruction.

Instruction Cycle

The processing required for a single instruction is called Instruction cycle. Here instruction cycle has been represented with diagram. It involves the following two steps.

➢ **Fetch Cycle**

The fetch cycle is that duration of time in which an instruction stored in the memory is brought to an appropriate register. All this happens under the commands from control unit of the CPU. The process of bringing an instruction from memory to a register is called a fetch cycle. It has to be completed in specified duration of time.

➢ **Execute Cycle**

The process of execution of an instruction by the CPU in a specified interval of time is called execute cycle. The instruction fetched from memory is placed in a register where it is decoded and executed by ALU in the execute cycle. The CPU when fetching an instruction is set to be in fetch stage and while executing an instruction is in execute stage. These two stages appear alternately.

Q5. Describe the procedure of execution of an instruction with diagram.

An instruction cycle (sometimes called fetch-and-execute cycle) is the basic operation cycle of a computer. It is the process by which a computer retrieves a program instruction from its memory, determines what actions the instruction requires, and carries out those actions. This cycle is repeated continuously by the central processing unit (CPU), from bootup to when the computer is shut down.

Explanation

The fetch cycle brings the instruction to the instruction register, which holds this instruction temporarily as long as it is being interrupted and executed.

Circuits used

The circuits used in the CPU during the cycle are:

➢ **Program Counter (PC)** - an incrementing counter that keeps track of the memory address of which instruction is to be executed next.

➢ **Memory Address Register (MAR)** - holds the address in memory of the next instruction to be executed.

➢ **Memory Data Register (MDR)** - a two-way register that holds data fetched from memory (and ready for the CPU to process) or data waiting to be stored in memory.

➢ **Instruction register (IR)** - a temporary holding ground for the instruction that has just been fetched from memory.

➢ **Control Unit (CU)** - decodes the program instruction, selecting machine resources such as a data source register and a particular arithmetic operation, and coordinates activation of those resources.

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➢ **Arithmetic logic unit (ALU)** - performs mathematical and logical operations.

Instruction cycle

Each computer's CPU can have different cycles based on different instruction sets, but will be similar to the following cycle:

1. Fetch the instruction

The next instruction is fetched from the memory address that is currently stored in the Program Counter (PC), and stored in the Instruction register (IR). At the end of the fetch operation, the PC points to the next instruction that will be read at the next cycle.

2. Decode the instruction

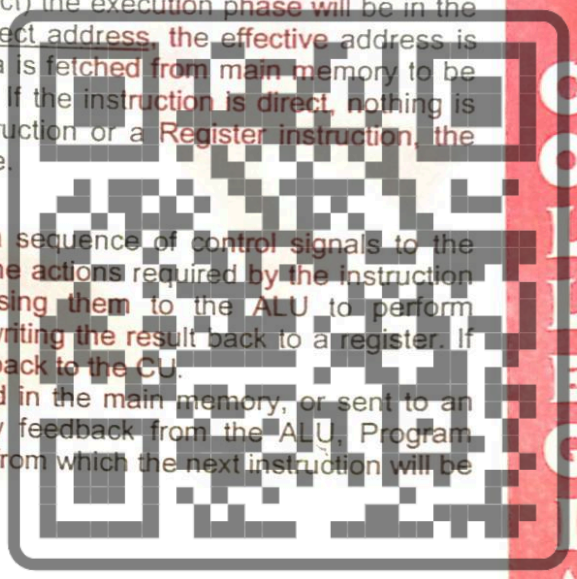
The decoder interprets the instruction. During this cycle the instruction inside the IR (instruction register) gets decoded.

3. Read the effective address

In case of a memory instruction (direct or indirect) the execution phase will be in the next clock pulse. If the instruction has an indirect address, the effective address is read from main memory, and any required data is fetched from main memory to be processed and then placed into data registers. If the instruction is direct, nothing is done at this clock pulse. If this is an I/O instruction or a Register instruction, the operation is performed (executed) at clock Pulse.

4. Execute the instruction

The CU passes the decoded information as a sequence of control signals to the relevant function units of the CPU to perform the actions required by the instruction such as reading values from registers, passing them to the ALU to perform mathematical or logic functions on them, and writing the result back to a register. If the ALU is involved, it sends a condition signal back to the CU.
The result generated by the operation is stored in the main memory, or sent to an output device. Based on the condition of any feedback from the ALU, Program Counter may be updated to a different address from which the next instruction will be fetched.



CHAPTER # 8

COMPUTER NETWORKS

Q1. Define the term computer network.

Computer Network

When two or more computers are connected to each other by cables or wirelessly to share resources, it is called a computer network

Explanation

Computers are connected to each other mainly for the sack of communication and resources sharing. A resource may be a hardware or software

Example

- LAN of an office
- WAN of a bank
- GAN the internet

Q2. What is a LAN structure? Describe famous LAN models.

LAN Structure / LAN Models

A LAN structure defines what type of role has been provided to the nodes of the LAN. The LAN model is apart from the physical layout of the LAN. The following are the two major types.

- **Peer To Peer Network**

In this network model all the nodes have equal rights and can directly communicate with one another. A peer to peer network is also called work group

- **Client Server Network**

In a client server network one or more computers are installed as server and all the other nodes are called clients. A sever is a high capacity, high speed machine which provides services to the nodes

Q3. Define topology? What are various topologies used for networks?

A topology is the physical layout of computer system, cables and network devices in a LAN.

OR

The physical arrangement of nodes in a network is called topology.

Explanation

The networks can be developed using various methods. Apart from the network models the topology defines the physical connection among the nodes.

Types OfLAN Topology

The following are the four basic topology used for LAN.

- Star Topology
- Ring Topology
- Bus Topology
- Hybrid Topology

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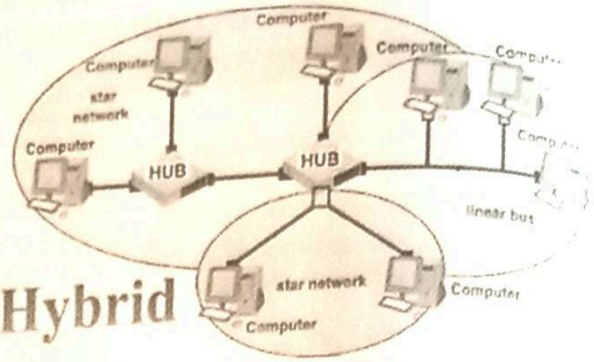
Q4. What do you know about hybrid topology?

Hybrid Network Topology

Hybrid network topology is a combination of two or more topologies.

Explanation

In hybrid network topology there may be a combination of two or more topologies like star topology, ring topology and bus topology. When two LANs (local area network) of star topology are connected through a cable from the central unit. It becomes star bus topology.



Hybrid

Q5. Define protocol. Why protocols are used describe with examples.

Rules and regulations applied for effective communication over the network are called protocols.

Explanation

A protocol defines the proper method of communication among the computers of a networks. The protocol provides error free, secure, fast and effective communication. A number of protocols have been defined for different purposes.

Examples

FTP: file transfer protocol
SMTP: simple mail transfer protocol.
TCP/IP: transmission control protocol/ internet protocol.

Q6. What is the (www) world wide web?

World wide web is the collection of hyper text documents.

Explanation

Over the internet the hyper text documents called web pages can be accessed. These web pages are published by companies or individuals containing information about different topics. A web browser felicitates to open web pages.

Example

www.google.com
www.hotmail.com
www.yahoo.com

Q7. What is a web browser? Describe with example.

A web browser is an application software which provides the facility to interact with the web pages.

Explanation:
A web browser is sent to open web sites. It displays text, images and other information one web page over the world wide web or in a local area network. A web browser enables a user easily and quickly accesses a web page.

Examples
Internet explorer
Netscape navigator
Google chrome

Q8. What do you know about extranet?
An extranet is a computer network that allows controlled access from the outside, for specific business or educational purposes. An extranet can be viewed as an extension of a company's intranet that is extended to users outside the company, usually partners, vendors, and suppliers. It has also been described as a "state of mind" in which the Internet is perceived as a way to do business with a selected set of other companies (business-to-business, B2B), in isolation from all other Internet users. In contrast, business-to-consumer (B2C) models involve known servers of one or more companies, communicating with previously unknown consumer users.

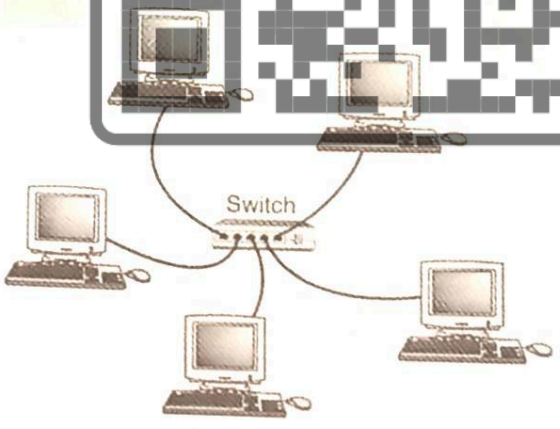
Q9. What do you know about intranet?
An intranet is a set of networks, using the Internet Protocol and IP-based tools such as web browsers and file transfer applications, that is under the control of a single administrative entity. That administrative entity closes the intranet to all but specific, authorized users. Most commonly, an intranet is the internal network of an organization. A large intranet will typically have at least one web server to provide users with organizational information.

"Long Questions and Answers"

Q1. Define network. Why network are used?

Computer Network
When two or more computers are connected to each other by cables or wirelessly to share resources, it is called a computer network.

Explanation
Computers are connected to each other mainly for the sake of communication and resources sharing. A resource may be a hardware or software.



Reasons to Develop Network
1. The very first objective to develop a network is to get communication. Two computers can communicate each other.
2. Hardware resources like printers, scanners and digital cameras can be sheared over the network.

3. Data files can be shared over the network.
4. The software can also be shared among different computers of the network.
5. Because of the resources sharing cost of devices can be saved and performance can be increase.

Q2. How many types of networks are there? Explain each of them?

The computer networks may be of the following three types.

1. LAN (local area network)
2. WAN (wide area network)
3. GAN (global area network)

LAN (Local Area Network)

A group of computers connected to each other in a small geographic area like home or office is called LAN.

➢ **Explanation**

A local area network is normally owned privately. The systems are connected wirelessly or through cables. Special network software are installed to run the whole setup.

➢ **Example**

1. A LAN (in any business office)
2. A computer lab (in an educational institute)

WAN (Wide Area Network)

A WAN is a computer network developed over a wide geographical area which can cover cities, states or countries.

➢ **Explanation**

WANs are normally used in large corporations to facilitate the exchange and on time update of data. It also enables LANs to communicate with each other.

➢ **Examples**

A country wide WAN of a bank.

GAN (Global Area Network)

A GAN is a worldwide interconnection of computer networks.

➢ **Explanation**

A GAN is the network of the networks through out the world. We also referred to it as internet. A GAN follows specific standard called protocols for communication. It is a public network.

➢ **Examples**

Internet

Q3. Define LAN. Write down important characters of LAn.

A LAN is a privately owned computer network in a small geographic location.

Explanation

A LAN is developed normally inside an office or home. The computer systems are connected by wirelessly or with wired media.

Characteristics of a LAN
The following are some major characteristics of a LAN.

- **Small Geographic Location**

LANs are developed in a building, house or office. It means that it is developed in a small geographic area.

- **LAN Machines**

The computer systems connected in a LAN are called nodes. A node which provide services is called server machine and a node which receives services is called client machine or work station.

- **Network Software**

In a LAN special operating systems are installed on the nodes. There are different client and server operating systems.

- **Resources Sharing**

The computer systems connected in a LAN can share the resources like data files, hardware and software.

- **Policy Based Management**

In a LAN all the systems in an organization can share a uniform policy and policy based management. A person who controls, implements and manages a LAN is called LAN administrator.

Q4. What is network operating system describe with example?

An operating system which is particularly designed for a network is called network operating system.

Explanation
A network operating system contains special features applied on a network. A network operating system is more advanced then an individual operating system.

Network Operating System Types
There are mainly two types of network operating systems these are as follows:

- **Server Operating System**

An operating system which manages all the client machines and provides services is called server operating system. It implements policies, user rights, restrictions and permission for work stations.

Examples
Windows 2003 server
Windows 2008 server

- **Client Operating System**

An operating system installed on a work station to get services from the server is called client operating system.

Example
Windows XP 2003
Windows NT workstation

Q5. What is a LAN structure? Describe features of famous LAN models.

LAN Structure / LAN Models

A LAN structure defines what type of role has been provided to the nodes of the LAN. The LAN model is apart from the physical layout of the LAN.
The following are the two major LAN models.

1. Peer To Peer Network. (Work Group)
2. Client Server Network (Domain)

1. Peer To Peer Network

In this network model all the nodes have equal rights and can directly communicate with one another. A peer to peer network is also called work group.

Features

1. There are equal rights and authorities among the nodes.
2. There is not any node as server.
3. Peer to peer network is less expensive.
4. Peer to peer network can work effectively up to 25 nodes.
5. Peer to peer network is useful for small organizations.

The Peer-to-Peer Model

Examples

- AppleShare used for networking connecting Apple products.
- Windows for Workgroups used for networking peer-to-peer windows computers.

Advantages

- Ease of setup
- Less hardware needed, no server needs to be purchased.

Disadvantages

- No central location for storage.
- Lack of security that a client/server type offers.

2. Client Server Network

In a client server network one or more computers are installed as server and all the other nodes are called clients. A sever is a high capacity, high speed machine which provides services to the nodes.

Features

1. All the nodes depend on a computer system called server.
2. The computer which gets services from the servers are called client.
3. For all the nodes the policies, user rights and permissions are imposed from the server.
4. Centralized control of the network is manages easily.
5. Centralized storage of data provides easy backup management.

6. In client server model a network of thousands of computers can be developed and manage easily.

Examples

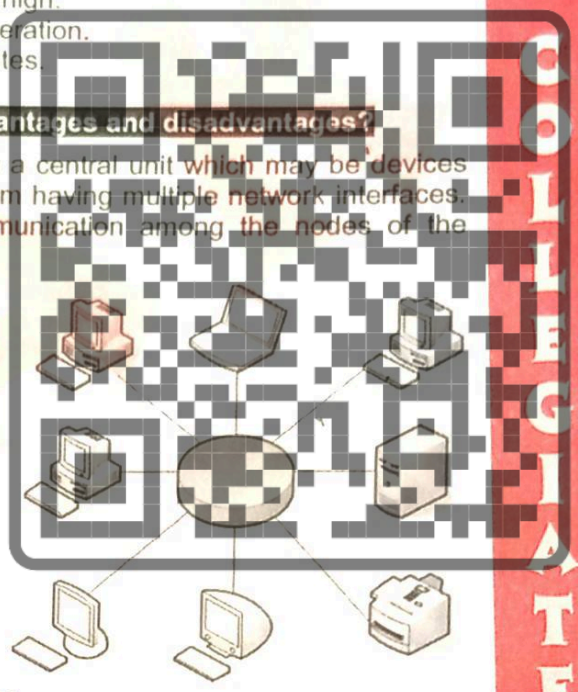
- Novell Netware
- Windows Server

Advantages

- Centralized servers are more stable.
- Security is provided through the server
- New technology and hardware can be easily integrated into the system.
- Servers are able to be accessed remotely from different locations and types of systems.

Disadvantages

- Cost of buying and running a server are high.
- Dependence on a central location for operation.
- Requires regular maintenance and updates.



Q6. What is star topology? What are its advantages and disadvantages?

In a star topology the nodes are connected to a central unit which may be devices like hub, switch or it may be a computer system having multiple network interfaces. The central unit is responsible for the communication among the nodes of the network.

Advantages Of Star Topology

The star topology is a most commonly used topology for a network and it has a number of advantages.

- **Easy Installation Of Nodes**

In a star network nodes can be added and removed easily, and the physical management of the network is quite comfortable.

- **No Chance Of Data Collision**

While using a star topology in a network there is no chance of data collision because central unit presents the collision of data.

- **No Influence Of Any Connection Failure**

If any node is failed to work or any connection is broken from any node or device the whole network is not affected and work continuously.

- **No Transmission Delay**

If the number of nodes are increased it does not affect the speed of the network because all the traffic passes through the central unit.

Disadvantages Of Star Topology

The star topology contains some weaknesses which are as follows:

➢ **Total Dependency On The Central Unit**

A star network is particularly dependent on the central unit like hub or switch. If the switch fails to work the whole network will be stopped.

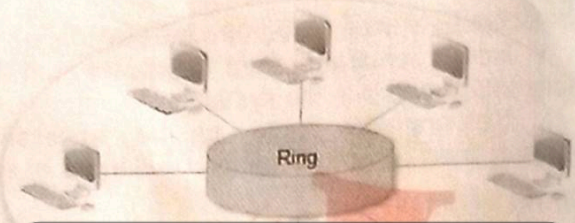
➢ **Expensive Hardware**

Since a separate cable for each computer is required so it becomes comparatively expensive. Similarly, the central unit is also compulsory which increases cost.

Q7. What is a ring topology? What are its advantages and weakness?

Ring Topology

In a ring topology the nodes are connected with each other in such a way that the structure look likes a ring.



Explanation

In ring topology all the nodes are connected in a ring like structure. The communications between the nodes follow a clockwise or anti-clockwise pattern. The data passes through node to node to reach the desired destination. The ring topology does not contain a central unit.

Advantages Of A Ring Network

The ring network contains the following advantages.

➢ **No Danger Of Data Collision**

The data flows in a single direction so there is no chance of collision of data.

➢ **No Dependence On Central Unit**

Unlike the star network the communication is not dependent on the central unit, so a ring network is more reliable in this regard.

Disadvantages Of Ring Network

The following are the disadvantages of the ring network.

➢ **Communication Delay:**

There is a direct proportion between the number of nodes and communication delay. So as the number of nodes increase, it results in more communication delay.

➢ **Difficult Network Extension**

In a ring network it is not so easy to add or remove the new terminals.

➢ **Difficult Trouble Shooting**

As compare to the star network it is difficult to trouble shoot any communication problem in a ring network.

➢ **Total Dependency On The Ring**

If the ring is broken the whole network stops working.

Q8. What is a bus topology? What are its advantages or disadvantages?

Bus Topology

In a bus topology the nodes are connected in a series on a network cable.

Explanation

In a bus topology all the computers and devices are connected on a network cable. Usually a circuit board or card is used to connect one of the expansion slot. The card contains the hardware and software required to access the network. All the communication take place on a common network cable. In a bus network there is no central unit.

Advantages Of Bus Network

The bus network contains the following advantages.

- **Easy Extension Of Networks**

The new terminals can be added or removed easily in a bus network.

- **Easy Network Management**

A bus network is simple and it is easy to administrate.

- **No Influence Of Any Node Failure**

In a bus network if one of the terminal become defective it does not effect on other computers of the networks.

Disadvantages Of Bus Network

A bus network contains the following weaknesses.

- **Extra Hardware And Software Requirement**

In a bus network extra circuitry and software are required to avoid collision of data.

- **Difficult Error Detection**

If any error is produced in a network it is not easy to detect.

- **Total Dependency On Main Cable**

If a connection in the bus network is broken the entire network may stop working.

Q9. What are different network components of a LAN? Explain in detail.

A local area network is developed using several standard components. These components can be categorized mainly as.

1. Software Components
2. Hardware Components

Software Components

When a computer network is developed special software's are required to run a network effectively.

- **Network Operating System**

A network operating system is an special operating system designed specifically to install on the nodes of the network. It manages all the activities of the computer system and communication.

➢ **Special Purpose Network Software**

In computer network special purpose network software are also installed to get advantages like communication and network protection. Anti-viruses, emailing and file transferring softwares are the examples.

Hardware Components

In order to develop a computer network besides the computer system some hardware are also required. These are as follows:

➢ **Connection Cables**

To develop a LAN special cables are required to connect the computer systems. Twisted pair cables, ca-axial cable or fiber-optic cables can be used to connect computer systems. The connection among the computer systems can also be wireless connection using infra-red, radio-ware, Bluetooth or wifi.

➢ **Network Interface Card**

Network interface card is a small circuit board which is inserted in any expansion slot. It is abbreviated as NIC. It provides the processing features for communication among the computers in a network. 3com, zoltrix and smartlink are the examples of NIC.

➢ **Special Purpose Network Devices:**

For proper management, control and administration some special purpose network devices are used. These devices perform the task like regenerating of signals, boosting of the information packets and providing error free communication. The examples include routers, bridges and gateways.

➢ **Shared Devices**

Some peripheral devices are also installed in a network to get the advantage of sharing. These devices can be shared by all the computer systems connected with the network. Examples include printers, scanners, fax machines and storage devices etc.

Q10. Describe the purpose of various network devices like NICs, Repeaters, Hubs, Switches, Bridges, Routers and Firewalls.

Apart from the physical communications media themselves as described above, networks comprise additional basic hardware building blocks interconnecting their terminals, such as network interface cards (NICs), hubs, bridges, switches, and routers.

Network Interface Cards

A network card, network adapter, or NIC (network interface card) is a piece of computer hardware designed to allow computers to physically access a networking medium. It provides a low-level addressing system through the use of MAC (Media Access Control) addresses.

Each Ethernet network interface has a unique MAC address which is usually stored in a small memory device on the card, allowing any device to connect to the network without creating an address conflict. Ethernet MAC addresses are composed of six octets. Uniqueness is maintained by the IEEE.

NORTH CAMPUS
D-70 Block H North Nazimabad
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Ph: 36640700-900

GULSHAN CAMPUS
GPC 3-4 Commercial Block 1
Gulshan Adj, to Post Office
Ph: 34801426-27

U.P. MORE CAMPUS
C-134, Sector 11-B, North Karachi
Adj. to Programmer School
Ph: 36981875, 36933799

JOHAR CAMPUS
C-56, Block 13, Gulistan-e-Johar
Opp. Dar-ul-Sehat, near Rado Bakery
Ph: 34611130-31

Repeaters and Hubs

A repeater is an electronic device that receives a signal, cleans it of unnecessary noise, regenerates it, and retransmits it at a higher power level, or to the other side of an obstruction, so that the signal can cover longer distances without degradation. In most twisted pair Ethernet configurations, repeaters are required for cable that runs longer than 100 meters. A repeater with multiple ports is known as a hub. Repeaters work on the physical layer of the OSI model. Repeaters require a small amount of time to regenerate the signal.

This can cause a propagation delay which can affect network communication when there are several repeaters in a row. Today, repeaters and hubs have been made mostly obsolete by switches.

Bridges

A network bridge connects multiple network segments at the data link layer (layer 2) of the OSI model. Bridges broadcast to all ports except the port on which the broadcast was received. However, bridges do not promiscuously copy traffic to all ports, as hubs do, but learn which MAC addresses are reachable through specific ports. Once the bridge associates a port and an address, it will send traffic for that address to that port only.

The first time that a previously unknown destination address is seen, the bridge will forward the frame to all ports other than the one on which the frame arrived.

Bridges come in three basic types:

- Local bridges: Directly connect local area networks (LANs)
- Remote bridges: Can be used to create a wide area network (WAN) link between LANs. Remote bridges, where the connecting link is slower than the end networks, largely have been replaced with routers.
- Wireless bridges: Can be used to join LANs or connect remote stations to LANs.

Switches

A network switch is a device that forwards and filters OSI layer 2datagrams (chunks of data communication) between ports (connected cables) based on the MAC addresses in the packets. A switch is distinct from a hub in that it only forwards the frames to the ports involved in the communication rather than all ports connected. A switch breaks the collision domain but represents itself as a broadcast domain. Switches make forwarding decisions of frames on the basis of MAC addresses. A switch normally has numerous ports, facilitating a star topology for devices, and cascading additional switches. Some switches are capable of routing based on Layer 3 addressing or additional logical levels; these are called multi-layer switches.

Routers

A router is an internetworking device that forwards packets between networks by processing information found in the datagram or packet (Internet protocol information from Layer 3 of the OSI Model). In many situations, this information is processed in conjunction with the routing table (also known as forwarding table). Routers use routing tables to determine what interface to forward packets (this can include the "null" also known as the "black hole" interface because data can go into it, however, no further processing is done for said data).

Firewalls

A firewall is an important aspect of a network with respect to security. It typically rejects access requests from unsafe sources while allowing actions from recognized ones. The vital role firewalls play in network security grows in parallel with the constant increase in 'cyber' attacks for the purpose of stealing/corrupting data, planting viruses, etc.

Gateways

A gateway is an interface which enables dissimilar networks to communicate each other. A gateway may be a device or software configured on a computer system.

Dissimilar network means networks having different topologies or operating system. For exampleMicrosoft configured gateway.

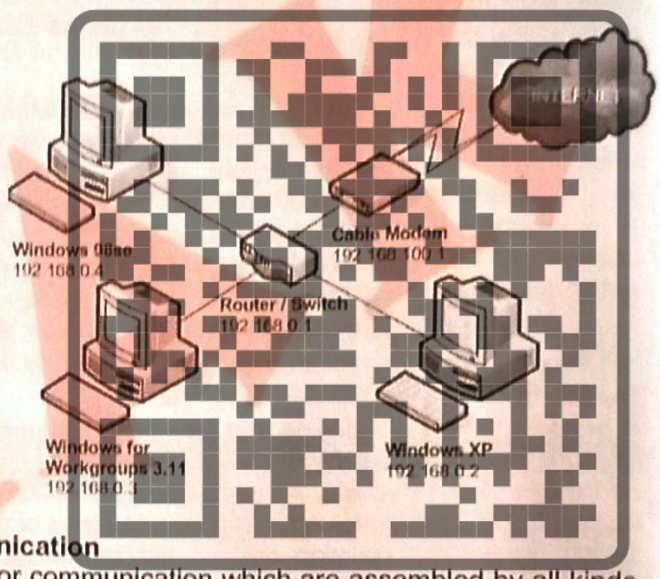
Q11. Define Internet. Write down major advantages of internet.

Internet

The internet is a global area network. It is the network of the networks.

Explanation

The internet was evolved from a network called "ARPANET". It was developed in 1969 by US department of defense. With the passage of time the protocols were established for communication. In 1983 a standard protocol with the name of TCP/IP was developed and in 1990 ARPANET was commercially introduced as internet.



Advantages Of Internet

Internet provides a number of benefits, these are asas follows:

- **Easy Method Of Communication**

Internet provides easy methods for communication which are assembled by all kinds of communities.

- **Cheap Method For Communication**

Internet provides fast and inexpensive methods for communication.

- **Sharing Of Information**

Using internet public information can be shared using World Wide Web.

- **On Time Transmission**

Data can be shared on time using various methods of internet. There no chance of delay.

- **Online Data Processing**

Online data processing for business like banks, utility bills etc are performed easily through internet.

- **Online Sales And Purchase**

Online sales and purchase is an advanced feature of internet.

- **Voice And Video Communication**

Besides the PSTN (public switch telephone network). Internet provides inexpensive and fast voice communication and video conferencing facility.

Q12. Define email. Write down its advantages and disadvantages.

Transformation of text messages over the internet is called e-male.

Explanation

The most of the websites allow users popular allows users to send and receive messages to each other using e-mail. The electronic file can also be sent and received using email. An e-mail address is developed on a website called domain. It contains the user name and the domain name.

The user name identifies the person who originates or receives the mail. The domain name identifies the computer system on which the user has on account. The e-mail address' parts are separated be @ and .sign.

Example

uwaisqurni@hotmail.com

Advantages Of E-Mail

The following are some advantages of e-mail.

- **Speedy Transmission**

An email is delivered at the moment when it is sent. There is not any other such kind of fast mail delivery system.

- **Inexpensive Transmission**

Electronic files and letters can be sent and received on a very less cost.

- **Availability**

The facility is available normally every time and everywhere.

- **Flexible Management**

It is easy to send and receive mail a number of features are provided by the email service providers.

Disadvantages Of E-Mail

The following are some disadvantages of e-mail.

- Email facility is generally available to everyone.
- Any email send to wrong address cannot be recalled back .
- It is not completely private or confidential due to hacking.
- It can be misused because it is free of cost.

An email may contain any virus or file that can affect the computer system.

CH 09

CHAPTER # 9

DATACOMMUNICATION

Q1. Define Data Communication? Describe communication Model.

Data Communication
Data Communication or Telecommunication is a process of transmitting and receiving data using technology across a distance.

Explanation
In Data Communication, the data is sent from a source to destination. The data may be in the form of text, images, voices or videos. The data communication is a study of data transmission using computer system

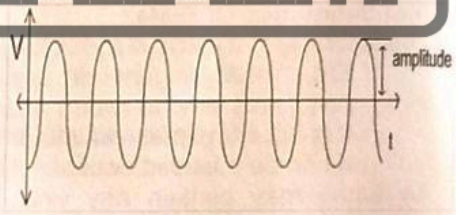
Data Communication Model
The data communication model includes the following elements for complete and effective communications.

- Source
- Transmitter
- Medium
- Message
- Receiver
- Destination

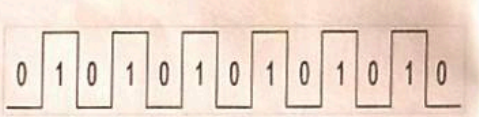
Q2. How many types of signals are there in data communication?
The following are the two types of signals used in communication technology.

Analog Signal
An analog signal is continuous electrical signal in the form of a wave.

Explanation
An analog signal contains the characteristics of a wave. The wave is in the form of crust and trough. The height of wave from its mean position to extreme position is called amplitude. The number of cycles completed in one second is called frequency of analog signal.



Digital Signal
A digital signal is represented by a discrete number 0s and 1s.



Explanation
A digital signal is not in the form of a wave. It

is generated by electric pulses in the form of represent low and very low voltages of current.

Q3. What do you know about bandwidth? Also describe the types of the bandwidth.

Bandwidth is defined as the capacity of a media for transmission and handling of data.

Explanation

The Bandwidth defines the capacity of data transmission for the cables used in a network. Bandwidth is the range of frequencies that is available for the transmission of data.

Types of Bandwidth

The following are the three major types of Bandwidth

- Narrow Band
- Voice Band
- Broadband

Q4. Define communication medium? Explain various communication medium?

The communication medium is the thin through which the data is transferred from source to destination.

Types of Communication Media

The following are the major types of communication media.

Wired Communication Media

In wired communication special purpose cables are used for the transmission of data

Example

- Twisted Pair Cable
- Co-Axils Cable
- Fiber Optic Cable

Wireless Communication media

In wireless communication special purpose equipment are used to send and receive data. Data is sent wirelessly in the form of a signal depending on the technology being used.

Example

1. Microwave
2. Satellite

Q5. What is wireless communication?

Wireless communication media

In wireless communication special purpose equipment are used to send and receive data without using wires. Data is sent wirelessly in the form of a signal depending on the technology used.

Types of transmission

The following are the most commonly used communication media for wireless communication.

- Microwave Transmission
- Satellite Transmission

"Long Questions and Answers"

Q1. Define Data Communication? Describe communication Model.

Data Communication

Data Communication or Telecommunication is a process of transmitting and receiving data using technology across a distance.

Explanation

In Data Communication, the data is sent from a source to destination. The data may be in the form of text, images, voices or videos. The data communication is a study of data transmission using computer system

Data Communication Model

The data communication model includes the following elements for complete and effective communications.

Source

The entity which wants to sent data is called source. When a person is speaking to someone he is the source.

Diagrammatic Representation

Transmitter

Transmitter is a device wh sen e sender or source it means that it performs the task of encoding. For example, when a person speaks his tongue is transmitter.

Medium

The medium is the thing ugh which data is transmitted. For example, when a person speaks, the air is edium through which sound wave is passed.

Message

The data which is sent b so called message. For example, when a person speaks, the spoken 's co e message.

Receiver

The Receiver is a device whi eiv the data and decodes it in the form which is readable by the destination. r ex ple, when a person is speaking to another person, the other person's ear is the eiver.

Destination
The entity which receives the data through receiver is called destination. For example, when a person speaking to another person, the other person is the destination.

Q2. How many types of transmissions are there regarding direction of transmission?

The Data direction in a transmission can be unidirectional or bidirectional. There are following three types of transmission on the basis of direction.

- Simplex Transmission
- Half Duplex Transmission
- Full Duplex Transmission

Simplex Transmission
The simplex transmission contains the transmission of data in only one direction.

- **Explanation**

It is a one way or unidirectional transmission. A device connected in such transmission is either a sent only or received only device.

- **Example**

Transmission of Television
Transmission of Radio

Half Duplex Transmission
The half duplex transmission contains the transmission of data in two way direction.

- **Explanation**

Although the data is transmitted in two ways direction, but one direction at a time. So, half duplex communication is bidirectional but device connected to such transmission can be either a sending device of receiving device at a time.

- **Example**

- Wireless Transmission system
- CB Radio System

Full Duplex Transmission
In full duplex Transmission the data is transmitted in both the directions simultaneously.

- **Explanation**

The Full duplex transmission is faster than simplex and half duplex. It is also more expensive. Full duplex transmission is commonly used today and easily available.

- **Example**

Cell Phones Transmission
Micro Computer Transmission

Q3. What do you know about bandwidth? Also describe the types of the bandwidth.

Bandwidth is defined as the capacity of a media for transmission and handling of data.

Explanation
The Bandwidth defines the capacity of data transmission for the cables used in a network. Bandwidth is the range of frequencies that is available for the transmission of data.

Types of Bandwidth
The following are the three major types of Bandwidth

- **Narrow Band**

The Narrowband communication media contains relatively slow speed for transmission of data. The telegraph lines are the example of narrowband.

- **Voice Band**

The Voice band communication media is faster than the narrowband. Most telephone lines used today have the voice band communication media. It can be used for microcomputer transmission of data.

- **Broadband**

This communication media can transmit huge amount of data at very high speed Co-Axial Cable, Fiber Optic and Satellite are the example of broadband communication.

Q4. Describe the various transmission modes in detail.

Transmission Mode
The Transmission mode defines that in which form the data is transmitted from source to destination in a computer network.

Types of Transmission Modes
The following are the two types of transmission modes.

Asynchronous Transmission
In this transmission mode data is sent one byte at a time.

- **Explanation**

In asynchronous transmission data is transmitted byte by byte means 1 byte at a time. Each byte consists of 8 bits and it is preceded by a 'start' bit and 'stop' bit. This transmission mode is inexpensive but relatively slow. It is widely used in micro-computers.

Synchronous Transmission
In this transmission mode data is transmitted in the form of blocks or packets.

- **Explanation**

In synchronous transmission data is transmitted in the form of packets. A packet may contain several bytes but there is no 'start' or 'stop' bit. Synchronous transmission is used by large computers. It is used to transmit great volume of data. Synchronous transmission is expensive but contains very high speed. Complex and expensive timing devices are used in this transmission mode.

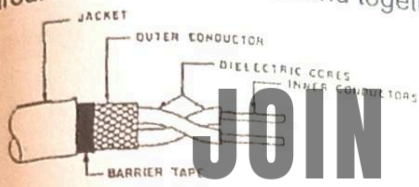
Q5. What is wired communication media? Explain the structure and features of twisted pair cables.

Wired Communication Media
In wired communication special purpose cables are used for communication.

Types Of Data Cables
The following are the most commonly used cables for communication.
- Twisted Pair Cables
- Co-axial Cables
- Fiber Optic Cables

Twisted Pair Cable
The twisted pair cable is a communication media which provide relatively slow but error free communication.

Structure
Twisted Pair Cables consists of two wires individually insulated in plastic then twisted around each other and bound together in another lair of plastic insulation.



Advantages and characteristics
- **Effective Communication**
In short ranges the twisted pair cables provides effective communication.
- **Error Free Communication**
In short distance it provides error free communication.
- **Easy Installation**
Twisted pair cables are very easy to install.
- **Inexpensive**
Twisted pair cables are comparatively inexpensive and easily affordable.
- **Use**
It can be used not only for voice but also in computer networks.

Disadvantages
- It does not perfectly control the noise interference which can disturb the signals.
- In order to use twisted pair cables for long distance, needs a signal regenerating device called repeater.
- The data communications through twisted pair cables are relatively slow.

Q6. What is wired communication media? Explain the structure and features of co-axial cable.

In wired communication special purpose cables are used for communication.

Types Of Data Cables
The following are the most commonly used cables for communication.
- Twisted Pair Cables

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- Co-axial Cables
- Fiber Optic Cables

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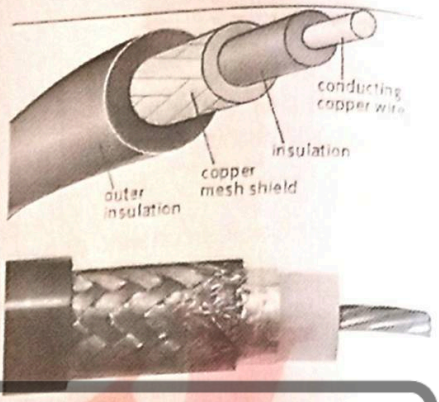
Co-axial cables

The co-axial cable is a communication media which provide relatively fast communication in television and computer networks.



Structure

The co-axial cable consists of insulated copper wire wrapped in a wire mesh shield, then in an external cover. The wire mesh shield Is in between the insulator and plastic cover.

Advantages and Characteristics

- **Higher Bandwidth**

The co-axial cable provides higher bandwidth for communication.

- **Support Transmission**

It supports transmission speed up to 10 megabits per second.

- **Protection Against Noise Interference**

Co-axial cable is best known for its protection against noise interference.

- **Data Carrying**

It can carry more data than older types of twisted pair cables.

Disadvantages

- Co-axial cable is expensive as compare to twisted pair cables.
- It is used in a limited geographical area.

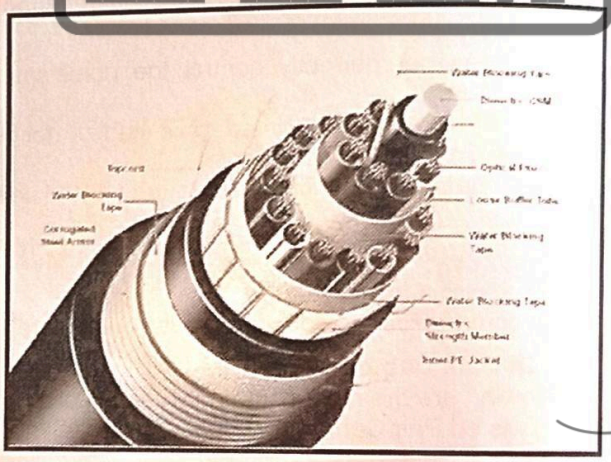
Q7. What is wired communication media? Explain the structure and features of fiber optic cable.

In wired communication special purpose cables are used for communication.

Types Of Data Cables

The following are the most commonly used cables for communication.

- Twisted Pair Cables
- Co-axial Cables
- Fiber Optic Cables.



Fiber optic cables

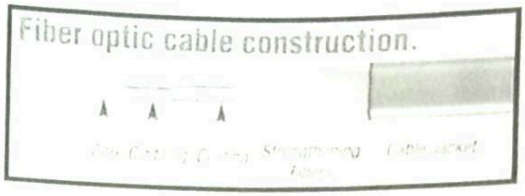
The fiber optic cable is a communication media that transmits digital data in the form of modulated pulses of light.

Structure

The optical fiber consists of an inner cylinder of glass which is called core. The core is actually propagating path for the light. It is surrounded by a cylindrical shell of glass or plastic of lower refractive index which is called cladding.

Data transmission

The transmission of light through a fiber is based on total internal reflection, which occurs when light is incident at an interface between two mediums of different refractive indexes at an angle greater than critical angle.



Advantages and Characteristics

- **Transmission Of Data**

The fiber optic cables transmit data faster than some other technologies.

- **Main Ingredient**

The main ingredient is glass which is prepared by sand and it is easily available in the world. So its material is comparatively inexpensive and light.

- **Form Of Transmission**

Since, the data is transmitted in the form of light through the fiber optics, so it's safer because there is no chance of spark and electrical shock.

- **Low Rate Of Errors**

Since, the fiber optic carry light pulses, it is not affected by random electromagnetic interference in the environment. So there is lower rate of errors than other media.

- **Low Rate Of Transmission Loss**

The transmission loses in fiber optics are much lower than that of the twisted pair wires and co-axial cables.

- **Durable**

It is more durable than twisted pair and co-axial cables because it is immune to oxide degradation.

- **Security Of Data**

It is more reliable for data security. Data cannot be tapped or stolen.

Disadvantages

- All fiber optic cables are limited to fixed point to point ground installation. They cannot leave the ground nor be associated with a mobile communication station.
- Popular light emitting sources are restricted to very low power devices. There are high power devices available but they are very expensive.
- The ways in which the light source can be modulated are limited because of low power sources. The distance between repeater/amplifier must be relatively short for high data rates demanded in some systems.

Q8. What is wireless communication? Explain microwave transmission.

Wireless Communication Media

In wireless communication special purpose equipment are used to send and receive data without using wires. Data is sent wirelessly in the form of a signal depending on the technology used.

Types Of Transmission

The following are the most commonly used communication media for wireless communication.

- Microwave Transmission
- Satellite Transmission

Microwave Transmission

Microwave system transmits voice and data through the atmosphere at high frequency radio waves.

➢ **Explanation**

Microwaves are the electromagnetic waves that vibrate at one gigahertz per second or higher. These frequencies are used to transmit messages between ground based earth stations and satellite communication systems since the microwave signals cannot bent so the microwave transmission is in a straight line, means in a line-of-sight. Moreover as the waves cannot bend, these are relayed by means of dishes or antennas installed on high buildings, towers and hilltops.

➢ **Ranges**

Microwave station needs to play within 40-50 kilometers of each other with no obstructions in between.

➢ **Example**

Nowadays most of the telephone system used dish microwave transmission.

Q9. What is wireless communication? Explain satellite transmission.

Wireless Communication Media

In wireless communication special purpose equipment are used to send and receive data without using wires. Data is sent wirelessly in the form of a signal depending on the technology used.

Types Of Transmission

The following are the most commonly used communication media for wireless communication.

- Microwave Transmission
- Satellite Transmission

Satellite Transmission

Satellite transmission systems contain microwave relay stations in the orbit around the earth for communication.

➢ **Explanation**

The satellite communication overcomes the major problem of microwave communication that is obstruction of signals. The obstruction of signals is caused by the curvature of earth, mountains and other structures that lock the line of sight. The microwave relay stations in the orbit of the

earth are called SKY STATIONS. Which contain a component called TRANSPONDER. The transponder receives the transmission form earth station, amplifies the signals, and retransmits them to another earth station. The satellite contains many communication channels and receives both analog and digital signals from earth station.

➢ **Ranges**

The satellite is launched by rockets and normally the orbit is 36,000 kilometers above the equator. If the satellites revolving speed is equal to earth rotation. It seems to be stationary in the space; hence the satellite is called GEOSTATIONARY.

➢ **Example**

Hundreds of satellites are now in orbits to handle international and domestic data, voice, video communication needs. BADAR-1 and BADAR-2 are Pakistan's famous satellites.

Q10. What is OSI model? Explain different layers of OSI model.

OSI model

An international standard for communication defined by ISO (International Standard Organization) is called OSI (Open System Interconnection).

Explanation

This standard has been defined by ISO that simulates the communication process using seven layers, each with its own set of protocols.

Purpose of OSI Model

The purpose of OSI model is to enable any vender's computer system to share data with any other vender's computer system in an open networking environment.

Structure of OSI Model

The OSI model contains seven layers having there specified purposes. These layers are as follows;

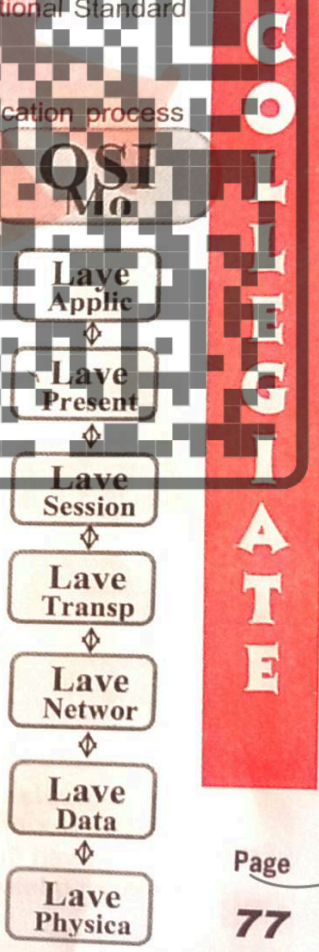
- LAYER-1: Physical Layer
- LAYER-2: Data-Link Layer
- LAYER-3: Network Layer
- LAYER-4: Transport Layer
- LAYER-5: Session Layer
- LAYER-6: Presentation Layer
- LAYER-7: Application Layer

➢ **Layer-1:- Physical Layer**

The physical layer controls the electrical, mechanical and functional transmission of bits over the data circuits.

➢ **Layer-2:- Data-Link Layer**

The data-link layer detects and compensates for transmission error and ensures that information sent by high speed transmitters is properly received by slow receivers.



➢ **Layer-3:- Network Layer**
The network layer determines how information is routed between computers and within and between individual networks. It also handles software interfaces between networks, including networks with different protocols.

➢ **Layer-4:- Transport Layer**
The transport layer specifies the rule for information exchange and manages end-to-end delivery if information within and between networks including error recovery. It also controls information flow. For example: - Multiple data streams on a single channel.

➢ **Layer-5:- Session Layer**
The session layer controls the dialog between two computers, managing file transfer and putting checkpoints into a data stream to allow portions of files to be retransmitted as needed.

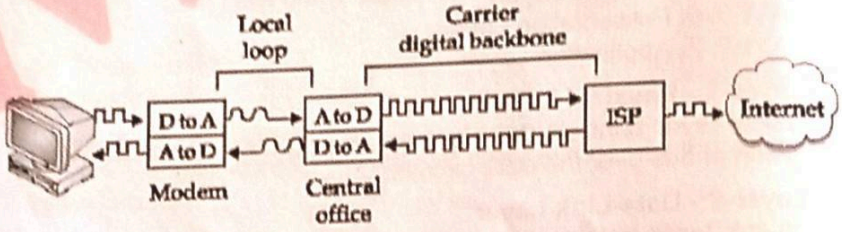
➢ **Layer-6:- Presentation Layer**
The presentation layer supplies transparent communication by masking difference in unlike data formats such as the ASCII and EBCDIC character codes, and performs data compression and encryption.

➢ **Layer-7:- Application Layer**
The Application layer supplies functions for particular applications such as file transfer, remote access, and virtual terminals.

Q11. Explain various communication hardware.
When two or more computer systems communicate each other, they need to have a communication hardware that is a device which control the flow of data. The following are some commonly used communication hardware.

➢ Modem
➢ Ethernet
➢ Fast Ethernet
➢ Token Ring

Modem
When the computer system communicates over the telephone line a device is required to control the flow of data which is called MODEM.



➢ **Explanation**
Since the computer systems communicate digitally it needs to have a device which can convert the digital signal into analog signal so that the signal can be transmitted on analog telephone lines.

➢ **Functions Of Modem**

The modem converts the digital signal into analog signal, this process is called MODULATION. Similarly analog signal into digital signal and this process is called DEMODULATION. The device had got the name MODEM (short for MODULATION/DEMODULATION).

➢ **Types Of Modem**

A modem may be internal or external. An external modem is a separate box and it is externally connected to the computer. An internal modem is a circuit board which is plugged in any expansion slot on the motherboard.

➢ **Transmission Speed**

The transmission speed of a modem is expressed in kilobits. A 128kbps and 256kbps are the commonly used speeds for the modem.

Ethernet

The Ethernet is the most common network technology used to connect two or more computers in a small geographic area.

➢ **Explanation**

Ethernet was basically design for a bus topology and co-axial cable, but nowadays it is also available on star topology with twisted pair or fiber optic cables. With Ethernet, if two nodes transmit data simultaneously, the collision is detected; they retransmit one at a time. This approach to network communication is called CSMA/CD (Carrier Sense Multiple Access/Collision Detection).

➢ **Transmission Speed**

The original implementation of Ethernet which uses co-axial cable was called 10base-5 and 10base-2. The most popular implementation if Ethernet is 10bas-T that used star topology and twisted pair cables and can achieve transmission speed up to 10 mbps.

Fast Ethernet

An advanced form of Ethernet which can be used as different network interface cards is called FAST ETHERNET.

➢ **Explanation**

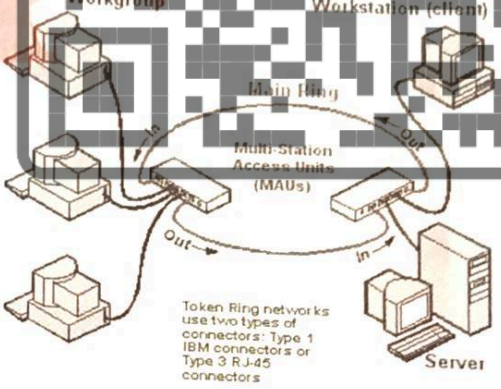
The fast Ethernet uses different types of media and topology as Ethernet. But it can be used for different network interface cards.

➢ **Transmission Speed**

It is normally available in a 10mbps speed and called 100based-T.

Token Ring

Token ring is a network technology introduced by IBM. It provides controlling hardware in a token ring network that transmits an electronic token for the nodes.



➢ **Explanation**

The controlling hardware in a token ring network transmits an electronic token (a small set of data) that travels around a ring of nodes in the form of the header.

The reader contains control signals, including one specifying whether the token is free of carrying a message. A sender node captures a free token as it travels from node to node, changes it to "busy", add the message

and set the address where the data should be sent. The token ring then contain around the ring and each computer along the way looks at the address until the token reaches the computer with the address that was recorded in the token. The receiving computer copies the contents of the token and sends an acknowledgement to the sending computer. When the sending computer receives the acknowledgement from the receiving computer, it resets the token state to "empty" and transmits it to the next computer in the ring.

Q12. What are the various communication software? Explain in detail.

Communication Software

Communication software consists of the programs that enable the host computer to establish, co-ordinate, monitor and control the flow of data through data communication system. Here are some of the tasks accomplished by such programs.

- **Data Sequencing**

It refers to breaking a long transmission into smaller blocks and maintaining control i.e. a long message is split up in to smaller packets. This technique is widely used in conjunction with error control techniques to reduce the amount of data that must be retransmitted in case of a detected error.

- **Data Routing**

Routing algorithms are designed to find the most efficient paths between sources and destinations. They can handle varying degrees of traffic on the present network configuration with optimal line utilization. Normally, they are dynamic enough to accommodate network changes and growth.

- **Flow Control**

Communication software also prevent a fast sender from overwhelming a slow receiver. It ensures resource sharing and protection against congestion by regulating the flow of data on the communication lines.

- **Error Control**

Data may be garbled or bits may be lost during transmission. It is essential to have programs that can determine if errors have occurred and cause the data to be retransmitted if necessary.

- **Co-Ordination Multiple Use Of Communication Lines**

When several terminals share communications channels to a computer, programs that co-ordinates data transmissions are needed. Posting is one technique for maintaining smooth flow of data to send. With another similar technique, called contention, "asked" if it has data to send. With another similar technique called contention, each terminal is instructed to "see" if any other terminal is transmitting and, if so, to wait.

- **Connection Establishment**

When two stations of a network want to communicate with each other, the communication software establishes and verifies a connection between the two.

- **Data Security**

Providing data security and privacy is called built into most communications software packages. It prevents access of data by unauthorized users because it is relatively easy to tap a data communications line.

- **Log Information**

Data communication software can also develop log information which consists of all jobs and data communication tasks that have taken place. Such information is normally used for financial purposes and the various users of the network are charged accordingly

CH 10

CHAPTER # 10
COMPUTER SYSTEM PPLICATIONS

Q1. Why it is necessary to learn computer.
OR What is the practical use of computer in daily life?

The Computer is digital equipment. It contains most modern technology to solve all kind of problems. It is use not only for business, scientific, and technical purpose but also to solve general life problems.

Reasons To Study Computer

The computer is used in various areas of life. It facilitates the user in almost all the spheres of life. It is used for the following purposes

- For Learning And Academic Studies
- For Technological Developments
- For Employment And Business Activities
- For Fun And Entertainment

Q2. What are the areas in general life where computer systems are used?

A computer system is a multipurpose device it is used not only for business and technical problems but also for general life problems. The following are the areas where computer systems are serving the mankind.

1. Personal Productivity
2. Communication
3. Science, Research, Engineering
4. Education And Teaching
5. Fun And Entertainment
6. Arts And Imaging
7. Business And Ecommerce
8. Health And Medicines
9. Agriculture And Farming
10. Government Management Affair

CH 10

MAK COLLEGIATE

Q3. How computer can be used for personal productivity?

The growth of personal computing is an environment in which persons utilizes the computer systems for the management of their activities.. It's not uncommon for companies to have more personal computers more than of telephones. A variety of domestic and business applications of personal computing forms the personal productivity of the computer system. Domestic applications include everything from personal finance to education and even for entertainment. Microcomputer software is available to support thousands of common and not-so-common business applications. A growing family of software for personal or business productivity is the foundation of personal computing in the home and in the business world.

Q4. How computer is helpful in the field of arts and graphics?

Artists are using personal computer to generate and manipulate images. Sculptures, for example, can use personal computers to create models and experiment with variations before committing to an actual physical piece. Some fine arts museums of have created a permanent use of computer art, in which visitors can view art and also use computers to experiment with their own images.

Film industry makes extensive use of personal computers to control camera movements for special effect sequences in movies such as those in the star wars series. With a Musical Instrument Digital Interface (MIDI), personal computers can be used to control synthesizers to produce music.

Q5. How government of a country is using computer to manage government affairs?

The largest single user of computers is the federal government. The NADRA, for example; produces millions of tax documents, voter lists, national identity cards etc. A month with the help of computers. Computers are also used for forecasting weather, for servicing parts, for processing immigrants, for imparting justice, and-of-course- for collecting taxes.

Q6. What is the role of computer in agriculture?

Computers have penetrated to farms. Farmers now use small computers purchased for less than the price of a tractor to help with billings, crops information, cost per acre, feed combinations, and market price checks.

Cattle ranchers can also use computers for information about livestock breeding and performance. Furthermore, sheep can be shared by a computerized robotic shearing arm. The arm is guided by sensors and computer memory, which stores the dimensions of a typical sheep. In addition, computers can give people the option of working at home instead of in city offices.

"Long Questions and Answers"

Q1. Why it is necessary to learn computer. What is the practical use of computer in daily life?

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Reasons To Study Computer

The computer is used in various areas of life. It facilitates the user in almost all the spheres of life. It is used for the following purposes.

- **For Learning And Academic Studies**

The computer science is a modern technology which facilitates the students of schools, colleges, Universities and other professional institutes to enhance their capabilities. Using computers the students can search the required academic information and can improve their knowledge. Now a day's most of the educational institutes are using computers for learning and teaching.

- **For Employment And Business Activities**

The computer system has become a fundamental part for all types of business organizations like offices, superstores, multinational companies and manufacturing industries. The employers demand the human recourses that are familiar to operate computer system because the computer system plays an important role to perform business activities properly.

- **For Technological Developments**

The scientists and technicians use computer systems for research and development for various modern products. Scientific and technical calculations are performed with high accuracy and increased productivity.

- **For Fun And Entertainment**

A computer system is a multipurpose device it is not only used for technical and business activities but also it is used for fun and entertainment. A number of multimedia games and audio and video files can be played on computers.

CH 11

CHAPTER # 11

COMPUTER SYSTEM SECURITY

Q1. Define computer virus? How many types of computer viruses are there?

Computer Virus

A computer virus is a program designed to disturb, alter or destroy data stored on computer system.

Explanation

A computer virus is designed for the destruction of data in the computer system by business competitors, hackers and destructive mind persons. A computer virus can be passed from one computer to another floppy disk, over the local area network, over remote modem connection and over the internet connection.

Major Types of Viruses

The following are the major types of viruses.

- Worm
- Trojan Horse
- Time Bombs
- File Infectors
- Macro Viruses
- Boot Sector Virus

Q2. How a computer system can be prevented from a virus infection?

A virus can cause a serious problem for computer system. Different viruses produce different type of threats for computer system. Thousands of viruses are in existence, and more are being written each day. For a computer user there must be some strategy to prevent computer system from virus infection.

Antivirus

An antivirus is software which works to prevent the computer system from virus infection.

Famous anti viruses:

Some popular antivirus programs include the following:

- McAfee virus scan
- IBM antivirus
- Doctor Solomon's
- Norton Antivirus
- Symantec antivirus for the Macintosh

Q3. Define software piracy.

Software Piracy

Software piracy is a computer related crime which is an illegal duplication of copy righted software.

Explanation

Software piracy is a biggest issue affecting the computer industry. Millions of computers have made copies of program which they do not legally own. In most cases copying software is as easy as duplicating a cassette or photocopying a book.

Using software piracy a user can gain the use of the program without paying for it to the vendor. People are not aware that software piracy is a serious crime in Pakistan's criminal law.

"Long Questions and Answers"

Q1. Define computer virus? How many types of computer viruses are there? Describe how a virus can affect a computer system.

Computer Virus

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Explanation

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What A Virus Can Do

- A virus can destroy the data on computer system.
- A virus can destroy the software installed on computer system.
- A virus can produce problems like device locking, storage media lacking, and problem in system's speed.
- A virus can provide problems like continuous restart, drive formatting and hanging.
- Sometimes a virus can destroy even the hardware like storage media.

Major Types of Viruses

Viruses can be divided into several categories. These include worms Trojan horses, time bombs, file infectors, macro viruses, and boot sector viruses.

- **Worm**

A worm is a program whose purpose is to duplicate itself. An effective worm will fill entire disks copies of itself and it can spread to multiple computers on a network, essentially clogging the entire system with copies. Worms can commonly spread over the internet via-email message attachments and internet relay chat (IRC).

- **Trojan horse**

A Trojan horse refers to illegal instructions placed in the middle of a useful program. The program does something useful but also, via the Trojan horse instructions, does something destructive in the background. Sometimes a Trojan horse is disguised as a game or a utility program that users will find appealing; then, when the users begin running the "game", they discover that they have loaded another animal entirely. A Trojan horse may erase the data on the hard disk or cause other damages.

- **Time bombs**

Time bombs and logic bombs are designed to sit harmlessly on a system until a certain event or date causes the program to become active some bomb are activated by a date, a change to a file, or a particular action taken by a user or a program. The most famous time bomb is the Michelangelo virus, named after the great artist. On the artist's birthday (March 6) each year, the virus designed to destroy the contents.

➢ **File infectors**

Most viruses are file infectors that spread from program to program and do damage to files (such as exe or com files), data and directories. A file infector virus hidden on a floppy disk will transfer itself to any hard disk that the floppy comes into contact with. When another floppy disk is inserted into the computer containing that hard disk, the virus will copy itself onto that floppy disk. It is clear that viruses can spread rapidly through an organization.

➢ **Macro Viruses**

A macro virus is designed to infect a specific type of document file, such as Microsoft word or Excel files. These types of documents can include macros, which are small programs that execute commands.

➢ **Boot sector virus**

Regarded as one of the most hostile types of virus, a boot sector virus infects the boot record of a hard or floppy disk (a boot sector is a special area of a disk that stores essential files, the computer accesses during startup). The virus moves the boot sector's data to a different part of the disk or can make the data stored on the disk in accessible. When the computer is started, the virus copies itself into memory where it can hide and infect other disks.

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A virus can cause a serious problem for computer system. Different viruses produce different type of threats for computer system. Thousands of viruses are in existence, and more are being written each day. For a computer user there must be some strategy to prevent computer system from virus infection.

Antivirus

An antivirus is software which works to prevent the computer system from virus infection.

Function Of The Antivirus

1. An antivirus searches for the virus in the storage media which exists in the form of file, this process is called virus scanning.
2. The antivirus deletes or destroys the virus files from the computer system.
3. The antivirus repairs and manages the infected data files of the user in the storage media.
4. An antivirus is an automatic program which keeps an eye over every start up, on device attachment (like USB, Floppy, and File etc) and while network connection.
5. An antivirus prevents the computer system from virus destruction.

Famous Anti Viruses

Some popular antivirus programs include the following:

- McAfee virus scan
- IBM antivirus
- Doctor Solomon's
- Norton Antivirus
- Virex
- Symantec antivirus for the Macintosh

Q3. Define software piracy. What is the role of the copy right law to overcome software piracy?

CH 11

Software Piracy

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➢ **Explanation**

Software piracy is a biggest issue affecting the computer industry. Millions of computers have made copies of program which they do not legally own. In most cases copying software is as easy as duplicating a cassette or photocopying a book. Using software piracy a user can gain the use of the program without paying for it to the vendor. People are not aware that software piracy is a serious crime in Pakistan's criminal law.

Copyright Criminal Law

The copyright act 1992 of Pakistan is an amendment in the constitution which demonstrates it as a crime.

➢ **Explanation**

According to this copyright act it is illegal to make or distribute copies of computer programs without authorization. No other copy can be made without specific authorization from the copyright owner.

➢ **Penalties for software piracy:**

If the company programs have been pirated by someone, the company can take the following measures:

1. The company may prosecute under the provision of the copyright law.
2. The penalties and fines can be imposed by judicial Enquiry.

The criminal can be imprisoned up to 3 years.