

PHOTOGRAPHS OF CHARTS ON COMPUTER ENGINEERING

COMPUTER ENGG. (COM - 1) USE OF COMPUTERS

AT RAILWAY STATIONS / AIRPORTS
Computers used for booking tickets.

IN APPLICATIONS OF INTERNET
Internet is mainly used for education, research activities and in business applications.

IN OFFICES / BANKS / SHOPS
In banks, computers are mainly used to systematize, store and retrieve data about account holders.

IN SCHOOLS / COLLEGES
In schools, computers are used as teaching aids.

IN HOSPITALS
Computers are used widely for doing tests like ECG, CT Scan etc.

COMPUTER ENGG. (COM - 2) BASIC COMPUTER SYSTEM

MONITOR
Screen size, Brightness control, Contrast control, Color tone control, Power ON / OFF switch, Stand with tilt and swivel option.

MAIN SYSTEM UNIT
Main memory, Keyboard, Mouse, Floppy disc drive, Hard disc drive, Expansion slots, CPU - Central Processing Unit, Motherboard, Speaker.

KEYBOARD
Cables, Buttons.

COMPUTER ENGG. (COM - 3) KEYBOARD

MECHANICAL TYPE KEYBOARD SWITCH
Mechanical Switch: In this type of switches, two metal pieces or contacts are kept in open position and moved into closed position when switch is depressed.

RUBBER DOME SWITCH
NORMAL POSITION, KEY DEPRESSION, CONTACT MADE, KEY RELEASED.

THE KEYBOARD AND SCAN CODES
Scan Codes, Buffer.

COMPUTER ENGG. (COM - 4) CENTRAL PROCESSING UNIT

CPU or the Central Processing Unit is the brain of the computer. The CPU is a single large-scale semiconductor integrated circuit chip and is known as the microprocessor. The chip contains:

- An Arithmetic Logic Unit (ALU)
- Control unit which performs instruction fetch, instruction - decode and other control operations.
- Registers to store and manipulate data.
- Flags to temporarily remember certain special conditions.
- Buffers / Drivers for interfacing the microprocessor with external units like memory and Input / Output units.

MICROPROCESSOR INTERNAL ORGANISATION
Address bus, Address bus buffers, Internal bus, Control bus, Instruction register, Data bus, Data bus buffers, Stack pointer, Accumulator, ALU, Software register.

COMPUTER ENGG. (COM - 5) LASER PRINTER

WORKING PRINCIPLE OF A LASER PRINTER

- Initially, the Organic Photo Conductive (OPC) drum has uniform negative electrostatic charge.
- A data modulated laser beam scans the drum surface and converts selected negative points to positive.
- Dry toner powder gets attracted to the positive points of the drum and when the paper passes the drum, this powder on the drum surface gets transferred to the paper.
- This toner image is fixed on the paper with heat and pressure when paper passes through the heating rollers.

COMPUTER ENGG. (COM - 6) DOT MATRIX / INK - JET PRINTER

DOT-MATRIX PRINTER
These printers use a print head that shuttles back and forth across the width of the paper and a number of thin print wires on the head act as hammers that strike the ribbon and squeeze ink from ribbon to the paper.

INK-JET PRINTER
The print head is made up of small ink-filled chambers. When an electrical pulse from a heating element in a resistor, heats a tiny hole at the bottom of the chamber, this makes the ink to boil and form a small bubble of vapor. When the bubble further expands, the ink droplet overcomes the surface tension and the pressure of the bubble forces the droplet onto the paper forming a small dot. A number of these tiny dots form a character.

COMPUTER ENGG. (COM - 7) FLOPPY DISK & DISK DRIVE

FLOPPY DISK
A floppy disk requires floppy disk media to store data. The floppy disk is a circular shaped plastic disk, coated with magnetic coating, enclosed in a protective jacket.

FLOPPY DISK DRIVE
A system of levers, Read / Write head, Spindle motor, Stepper motor, Circuit board, Spindle motor, Spindle motor.

HEAD / WRITE HEAD
This is a magnetic read / write head, which reads from and writes to the disk. The head, in turn, magnetizes the non particles in the disk coating and creates bands of aligned, magnetized particles on the revolving disk. The two such bands represent the smallest discrete unit of data that a computer can handle - a bit. The head also, when reading any information from the disk surface, principle of the induced current on a conductor wire on the change of magnetic field at its work.

COMPUTER ENGG. (COM - 8) HARD DISK DRIVE

COMPONENTS OF HARD DISK DRIVE
Read / Write Head, Head Slider, Head actuator, Hard Disk Activity Light, Front Panel.

DRIVE HEAD WITH OTHER COMPONENTS
Magnet, Rotary Voice Coil, Head Actuator Shaft, Drive Head.

The electromagnetic coil is connected to the head rack and placed near a stationary permanent magnet. As the coil is given current, magnetic field will be generated in the coil. This magnetic force will make the coil to move away from or towards the permanent magnet. This will move read / write head over the disk surface.

COMPUTER ENGG. (COM - 9) MOTHERBOARD

Power connector, AT keyboard connector, Integrated I/O, DIMM Sockets, Smart Card, CPU fan connector.

MOTHERBOARD: The main component inside the main system unit is the motherboard. The motherboard contains many important components, such as:

- The CPU
- RAM and ROM
- Expansion chips for the CPU and
- Support slots to connect peripherals.

COMPUTER ENGG. (COM - 10) COMPUTER MEMORY

BITS AND BYTE
Bit (1), Nibble (4 bits), Byte (8 bits). A combination of 8 bits can have 2⁸ = 256 different combinations.

RAM AND ROM
RAM or Random Access Memory is the main memory inside the computer and is used to store program, data and results. ROM or Read Only Memory, as its name suggests, is a memory that can be read only. One cannot write any information into a ROM as it is non-volatile memory and information is stored into the ROM by the manufacturers.

PHYSICAL MEMORY ORGANIZATION
The memory modules are available in the following packing:
DIP (Dual In-line Package), SIMM (Single In-line Memory Modules), SIPP (Single In-line Pin Package), DIMM (Dual In-line Memory Modules).

COMPUTER ENGG. (COM - 11) PHYSICAL DEVICES USED TO CONSTRUCT MEMORIES

1. SEMICONDUCTOR FLIP-FLOP
The device used for making semiconductor memory cells is a semiconductor switch.

2. MAGNETIC SURFACE RECORDING
A magnetic field is created by passing a current through a coil wound on the head. A plastic surface coated with a ferro-magnetic material is placed below the head. The surface is magnetized in either of two directions (depending on the direction of the current assumed to represent a 1, and the right-to-left direction, assumed to be 0). The trace of magnetized surface may be assumed as binary 1s and 0s, as shown.

COMPUTER ENGG. (COM - 12) MAGNETIC SURFACE RECORDING METHODS - I

1. MAGNETIC HARD DISK
The disk drive consists of a motor to rotate the disk pack about its axis at a speed of about 3600 revolutions per minute. The drive also has a set of magnetic heads mounted on arms. A set of disk drives are connected to a disk controller. The disk controller accepts commands from the computer and positions the read-write heads of the specified disk for reading or writing.

2. A FLOPPY DISK
The floppy disk is a circular shaped plastic disk, coated with magnetic coating, enclosed in a protective jacket. When you push a 3.5 inch floppy disk into the drive, the floppy passes against a system of levers. When the heads are in the correct position, electrical impulses create a magnetic field in one of the holes to record data on either the top or bottom surface of the disk. When the heads are reading data, they react to magnetic fields generated by the metallic particles on the disk by sending electrical signal to the computer.

3. MAGNETIC TAPE RECORDING
Tapes are mostly used as a magnetic storage device. As tapes are compact, these are also used to exchange data and programs between computer installations.

COMPUTER ENGG. (COM - 13) MAGNETIC SURFACE RECORDING METHODS - II

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COMPUTER ENGG. (COM - 14) INTERCONNECTION OF COMPUTER UNITS

FIG. 1: ILLUSTRATING INTERCONNECTION OF COMPUTER UNITS VIA TWO SYSTEM BUSES
I/O UNITS, PROCESSOR, MEMORY.

FIG. 2: ILLUSTRATING DIRECT CPU-MEMORY CONNECTION
This is a bus-like structure. One bus interconnects the processor to the memory. The other bus, instead of connecting I/O units to the processor, connects them directly to the memory.

FIG. 3: A UNIBUS CONNECTION OF UNITS
The main advantage of this system is the addressing of I/O units. These units use the same memory address space. This simplifies programming of I/O units.

COMPUTER ENGG. (COM - 15) CACHE MEMORY / MEMORY INTERLEAVING

CACHE MEMORY
When any information is transferred from the memory to the processor or for writing to memory, the main problem is the 1 to 10 speed mismatch between the processor and the memory. This mismatch is resolved by using cache memory. Cache memory is a very small amount of very high speed memory used in between the main memory and the processor. The information frequently required by the processor is kept in the cache memory by a cache controller. This cache controller always tries to make sure that the data required by the processor in the next memory access is available in the cache memory.

MEMORY INTERLEAVING
Another method of increasing the effective speed of memory is achieved by memory interleaving. The method is to divide the memory into a number of sub-modules. Successive instructions in a program are put in successive modules. When an instruction FETCH is issued by the processor, a memory access circuit checks four consecutive addresses and places them in the four MA RA. As instructions are normally executed in the sequence in which they are written having four successive instructions readily available in the processor speeds up execution time. This method is effective in minimizing memory/processor speed mismatch.

COMPUTER ENGG. (COM - 16) PROCESSOR TO I/O AND INPUT TO MEMORY CONNECTION

DETAILS OF PROCESSOR TO I/O COMMUNICATION
MAB - Memory Address Bus, DB - Data Bus, DAB - Device Address Bus, Control, DC - Device Control.

DETAILS OF DIRECT DATA TRANSFER FROM INPUT TO MEMORY
This method uses the steps in the direct memory access (DMA) operation and eliminates the participation of the processor in data transfer. Processor's address bus is used to DMA transfer. Main advantage is that while writing new base and address buses connecting DMA memory and an address bus connecting processor to DMA.

COMPUTER ENGG. (COM - 17) UNDERSTANDING D.O.S.

WHAT IS DOS?
DOS is a Disk Operating System which provides a predictable linkage between your computer's electronic circuitry (hardware) and the software programs you use, such as word processors, electronic spreadsheets, database managers, and accounting programs.

DOS REQUIREMENTS
The various versions of DOS operate with Intel's 8086, 8088, 80186, 80286, 80386, and 80486 or Pentium family of microprocessors.

DOS AND THE KEYBOARD
DOS uses the function keys F1 through F8, in addition to several other keys. A list of functions and corresponding keys is contained in the following table.

KEY	FUNCTION
Alt	Complete command or exit a screen.
Ctrl	Move cursor one left or right on the screen.
Del	Deletes a character or a word.
Enter	Shows screen full or screen wrap or return.
Esc	Shows screen full or screen wrap or return.
Home	Shows screen full or screen wrap or return.
Page Up	Shows screen full or screen wrap or return.
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