BASIC COMPUTER ENGINEERING
BT - 205

W.E.F.: 01-11-2022

Lect. No.	Topic to be taught	Reference/Remarks	CO
	UNIT-I		
1	Computer: Definition, Classification	B-1(1-3)	CO1
2	Organization i.e. CPU	B-1(4-6)	CO1
3	Register	B-2(9-10)	CO1
4	Bus architecture	B-1(123-124)	CO1
5	Instruction set	B-1(125-126)	CO1
6	Memory & Storage Systems	B-1(58-62)	CO1
7	I/O Devices	B-2(95-104)	CO1
8	System & Application Software	B-2(113-115)	CO1
9	Computer Application in e-Business	Notes(Internet)	CO1
10	Bio-Informatics, Health Care	Notes(Internet)	CO1
11	Remote Sensing & GIS	Notes(Internet)	CO1
12	Meteorology and Climatology	Notes(Internet)	CO1
13	Computer Gaming	Notes(Internet)	CO1
14	Multimedia and Animation	Notes(Internet)	CO1
15	Operating System: Definition	B-3(3-7)	CO1
16	Functions of OS	B-3(7-10)	CO1
17	Types of OS	B-8	CO1
18	Management of File	B-3(57-58)	CO1
19	Process Management	B-3(95-107)	CO1
20	Memory Management	B-8	CO1
21	Introdcution to MS Word,	B-8	CO1
22	MS Powerpoint	B-8	CO1
23	MS Excel	B-8	CO1
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24	Introduction to Algorithms, Complexities	B-8	CO2
25	Flowchart	B-8	CO2
26	Introduction to Programming, Categories of Programming Languages	B-8	CO2
27	Program Design, Programming Paradigms	B-8	CO2
28	Characteristics or Concepts of OOP	B-8	CO2
29	Procedure Oriented Programming VS object oriented Programming.	B-4(4-7)	CO2

Lect. No.	Topic to be taught	Reference/Remarks	CO
30	Introduction to C++: Character Set, Tokens	B-4(36)	CO2
31	Precedence and Associativity	Notes(Internet)	CO2
32	Program Structure	B-4(40)	CO2
33	Data Types, Variables	B-4(38-43), B-4(45-47)	CO2
34	Operators, Expressions	B-4(49-52),B-4(58-60)	CO2
35	Statements and control structures	B-4(64-69)	CO2
36	I/O operations	B-4(22-24)	CO2
37	Array	B-4(42-43)	CO2
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39	Object & Classes	B-8	CO3
40	Scope Resolution Operator	B-4(96)	CO3
41	Constructors & Destructors	B-4(144-158)	CO3
42	Friend Functions	B-8	CO3
43	Inheritance	B-4(201-225)	CO3
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49	Introduction to Data Structures	Notes(Internet)	CO3
	UNIT-IV		
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51	ISO-OSI Model	B-7(36-37)	CO4
52	Functions of Different Layers	B-7(37-41)	CO4
53	Internetworking Concepts, Devices	Notes(Internet)	CO4
54	TCP/IP Model	B-7(41-43)	CO4
55	Introduction to Internet, World Wide Web	B-7(50), Notes(Internet)	CO4
56	E-commerce	Notes(Internet)	CO4
57	Computer Security Basics: Introduction to viruses, Worms	B-8	CO4
58	Malware, Trojans	B-8	CO4
59	Spyware and Anti-Spyware Software	B-8	CO4
60	Different types of attacks like Money Laundering, Information Theft	B-8	CO4
61	Cyber Pornography, Email Spoofing	B-8	CO4

Lect. No.	Topic to be taught	Reference/Remarks	CO
62	Denial of Service (DoS), Cyber Stalking	B-8	CO4
63	Logic bombs, Hacking Spamming	B-8	CO4
64	Cyber Defamation,Pharming	B-8	CO4
65	Security measures Firewall, Computer Ethics & Good Practices	B-8	CO4
66	Introduction of Cyber Laws about Internet Fraud, Good Computer Security Habits	B-8	CO4
	UNIT-V		
67	Introduction to Database Management System	B-5(1-2)	CO5
68	File oriented approach and Database approach	B-5(3-5)	CO5
69	Data Models	B-5(7-11)	CO5
70	Architecture of Database System	B-5(18-21)	CO5
71	Data independence, Data dictionary	B-6(29),B-6(35)	CO5
72	DBA, Primary Key	B-5(15),B-5(35-36)	CO5
73	Data definition language and Manipulation Languages	B-5(11-13)	CO5
74	Definition of Cloud computing, Cloud infrastructure	B-8	CO5
75	Cloud segments or service delivery models (IaaS, PaaS and SaaS)	B-8	CO5
76	Cloud deployment models/ types of cloud (public, private, community and hybrid clouds)	B-8	CO5
77	Pros and Cons of cloud computing	B-8	CO5

References:-

B-1: Computer System Architecture:Morrismano,TMH
B-2: Computer Fundamental: P.K.Sinha,PHI
B-3: Operating Systems:Silberschatz and Galvin,Wiley India
B-4: Object Oriented Programming with C++ :E.Balagurusamy, TMH
B-5: DataBase Management Systems:Korth, TMH

B-6: DataBase Management Systems:Navathe,TMH
B-7: Computer Networks:Andrew Tananbaum, PHI
B-8: Basic Computer Engineering:Silakari and Shukla,Wiley India

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UNIT-1

Fundamentals of Computers.

- **Definition:-**

① The word computer is come from the word "Compute" which means to calculate. So, computer is a calculating device which is used to perform arithmatic and logical operations at high speed.

OR

② A Computer is an electronic device that can accept, store and proccess information to produce the required results.

- **Features of a computer:**

1. **Speed:-** A computer can works with a high speed. It can perform millions of instructions (even more) per second.
2. **Accuracy:-** The accuracy of the computer is a very high. A computer performs each and every calculations with

the same accuracy.

3. Storage :-

A computer can store large amount of information in its memory. A computer have very large storage capacity. The information can be stored as long as desired by the users and can be recalled when required.

4. Diligence :-

A computer is free from tiredness and lack of concentration as compare to human beings. It can works many hours without creating any errors.

5. Versatile :-

Computer can perform a wide range of jobs with speed, accuracy and diligence. Computers are used in every fields such as education, accounting, homes etc.

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★ Generations of a Computer

The word 'Generation' for computers indicates a steps in technology.

The computer has following generation:

- First Generation computers (1942 - 1954)
- second Generation computers (1955 - 1963)
- Third Generation computers (1964 - 1974)
- Fourth Generation computers (1975 - 1990)
- Fifth Generation computers (1990 - till date)

★ First Generation (Vaccum tube)

- These first generation computer used Vaccum tubes for circuitry and magnetic drums for memory. The input to the computer was through punched cards and paper tapes. The output was displayed as printouts.
- The computation time was in milliseconds.
- These computers were enormous in size and required a large room for installation.
- They were used for scientific applications they were the fastest computing device of their time.

Ex:- UNIVersal Automatic computer (UNIVAC)
Electronic Numerical Intigrator And Calculator (ENIAC)

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Electronic Discrete Variable Automatic computer (EDVAC)

Disadvantages:-

- Too heavy in size
- Unreliable
- They produce large amount of heat
- Air conditioning required
- Possibility to frequent hardware failure
- constant maintenance required.
- Not portable.
- Commercial production was difficult and Costly.

* Second generation:- (transistors)

The second generation computers were developed by using transistors technology.

- Transistors replaced the vaccum tubes of the first generation computers.
- transistors allowed computers to become smaller, faster, cheaper, energy efficient and reliable.

The second generation computers used magnetic core technology for primary memory. They used magnetic

tapes and magnetic disks for secondary storages.

Ex:- IBM 1620, IBM 7094, CDC 1604, CDC 3600, UNIVAC 1108.

Disadvantages

- A cooling system was required.
- constant maintanance is required.
- Commertial production was difficult.
- Only used for specific purpose.
- Costly and not versatile.

* Third generation computer :- (IC).

- Integrated circuit (IC) technology.
- Size of computer smaller as compare to 2nd generation.
- The computing time taken by the computer of ~~the~~ 2nd Gen. ~~computer~~ was lesser than 2nd gen.
- consume less power and also generate less heat.
- The maintanance cost is low.
- The computer system was easier for commercial use.

Ex:- IBM (370), ICbit2900, PDP-11 and PDP - 8, IBM 360, many more

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Disadvantages:

- Air conditioning was required by these computers.
- The manufacturing of VLSI chips is required a highly sophisticated technology : also IC chips are not easy to maintain.

★ Fourth generation of computer :-

- VLSI (Very large scale integration) technology
- This technology led to the development of microprocessors, where an entire CPU circuitry is placed on a single chip.
- Fourth generation computers became more powerful, ~~computer~~ compact, reliable, and affordable.
- The first "Personal computer" or PC developed by IBM (International Business machine) belonged to this generation.

Disadvantages.

The manufacturing of VLSI (Very large scale Integration) chip was needed very advanced technology.

★ Fifth generation :- (VLSI)

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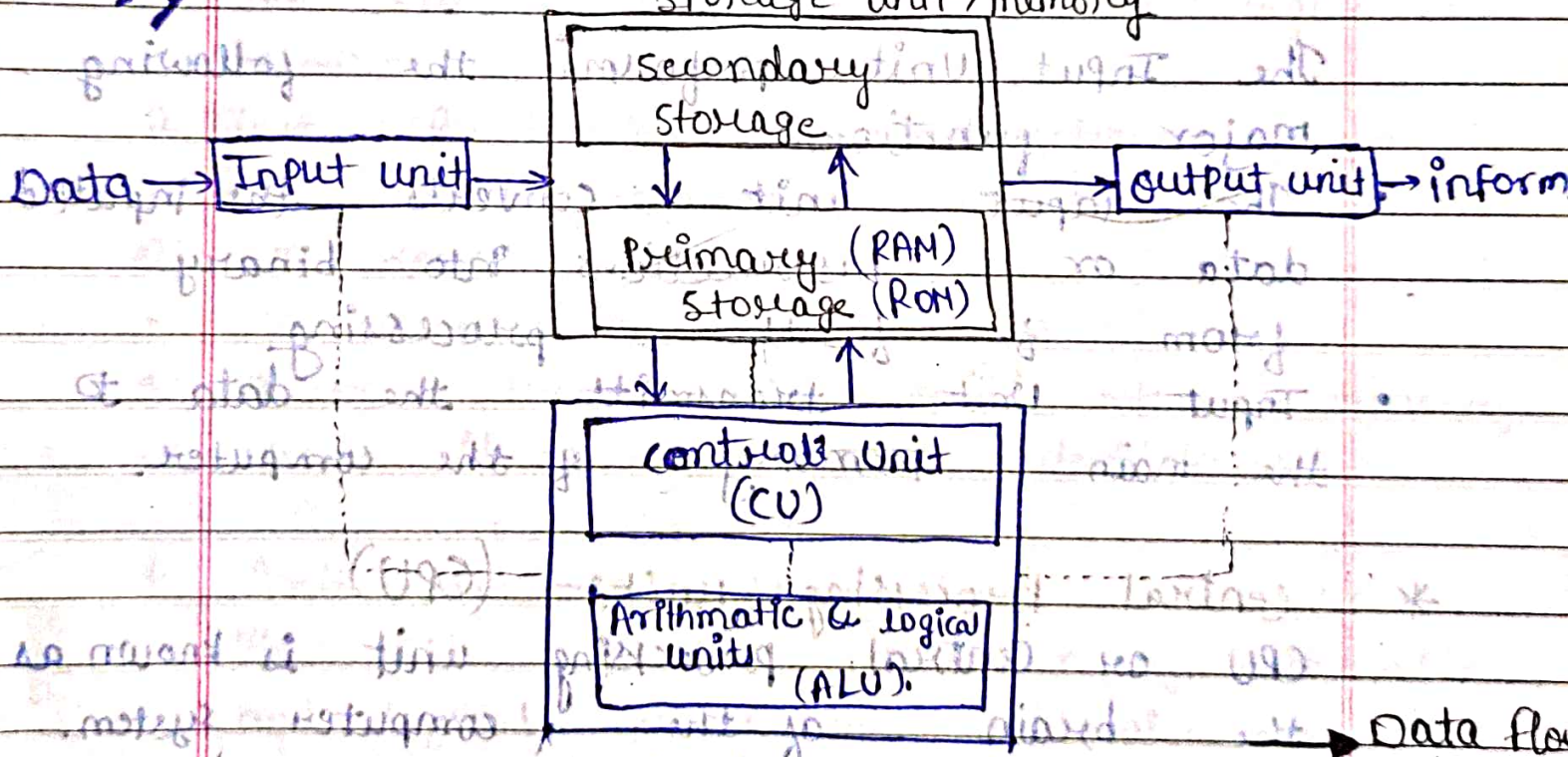
- In the fifth generation, VLSI technology became ULSI (Ultra Large Scale Integration) technology, resulting in the production of microprocessor chips having ten million electronic components.
- This generation is based on parallel processing hardware and AI (Artificial intelligence). It allows computers to behave like human.

* IMP

Computer Organization



Block diagram of a computer

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* Input Unit:

The Input unit consists of input devices such as a mouse, keyboard, scanner, joystick etc. These devices are used to input information or instruction into the computer systems. Like other electronic machines, a computer takes inputs as Raw data (binary data) and performs necessary processing giving out prossed data.

The Input Unit performs the following major functions:

- The input unit converts the inputted data or instructions into binary from for further processing.
- Input Unit transmits the data to the main memory of the computer.

* Central Processing unit:- (CPU)

CPU or Central processing unit is known as the brain of the computer system. It is an electronic hardware device that processes all the operations (e.g. arithmatic and logical operation) of the computer. In other words, all the major calculations, operation or comparisons are performed inside the

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CPU. It is also responsible for handling the operations of several other units.
It consists of control unit (CU), and arithmetic logic unit (ALU).

* Control Unit
The control unit is one of the important components of the CPU and It is responsible for the proper execution of the instructions. The execution of instruction performed by the CPU in sequence of 4 steps given as below:-

1) First CPU fetches the instruction issued by the User/ program from the memory.
2) It decodes the instruction.
3) It executes the instruction.
4) It stores the results back into the memory sends it to the output devid device.

* Arithmatic and logic unit:-
The ALU is the combination of arithmatic and logical units. The arithmatic unit (AU) is used to perform the arithmatic operations on the input data. Addition, substraction, multiplication, division are some of the examples of fundamental mathematical arithmatic operations

memory में CS जाता है।

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- The logical unit (LU) is used to perform logical operations on the input data. Equality comparison, less than, or less than or equal to, greater than or equal to, logical AND, OR, NOT are some of the examples of the logical operations that the LU unit can perform.

Imp * Memory Unit:- Memory unit is an essential part of the computer system which is used to store data and instruction before and after processing. The memory unit transmits the information to other units of the computer system when required.

Each memory location has a unique address and the smallest unit of the data is called a bit (0 and 1). The CPU can received these stored data in the form of bytes and instructions quickly. The memory can be broadly classified into following categories.

Imp Types of memory

- Primary memory → RAM → Static RAM, Dynamic RAM
  → ROM → PROM, EPROM, EEPROM
- Secondary memory → Magnetic tape, magnetic disk, Optical disk, Flash disk, Floppy disk
- Cache memory

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- Registers memory

- Primary memory :-
  - The primary memory is also called as the main memory or internal memory of computer.
  - The primary memory of a computer stores the data provided by the user and the instruction provided by the programs.
  - It is a portion of CPU where current data or program resided for execution in computer.
  - The primary memory is used placed on the motherboard in the form of chip.

There are two types of primary memory
(a) RAM (Random Access memory) or Volatile memory.
(b) ROM (Read only memory) or Non-volatile memory.

* Random access memory : (RAM)
  - This is the primary memory from where data and instructions can be retrieved in random manner using a unique memory address.

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- It is a volatile memory in which the contents are lost once the power is turned off.
- This kind of memory is used to store the data temporarily during the computer operations.
- Its size is measured in Megabytes (MB) or in Gigabytes (GB)

* The Ram is devided into two broad categories.

Imp

1) Static RAM.
2) Dynamic RAM

1) Static Random access memory (SRAM):-

- SRAM is a type of Random Access memory (RAM) that data bit in its memory as long as power is being supplied.
- It is a volatile memory based on traditionaty transistors using flip flop gates to hold data as long as power is on.
- It is very fast therefore they are used as cache memory.

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- The SRAM takes more space and it expensive too but it is easy to use.
- It does not need to refrashed periodically and synchronizes itself with the timing of CPU.

2) Dynamic random access memory (DRAM)

- It is a volatile memory based on the capacitors that hold data as long as the power is on.
- Due to discharging capacitors, the DRAM is refreshed periodically. This refreshing is done automatically and due to the time consumed in refreshing the DRAM is slow.
- It is inexpensive and takes less space therefore DRAM is used as the main memory.

* Read only memory (ROM)

- The ROM is the memory on which data is been recorded on an integrate circuit by the manufacturer. Once the data has been recorded. It cannot be changed.

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- The content of ROM can be read but it cannot be modified.
- It is designed to perform a specific function that is not changed and generally instructions are required for initializing the device stored in ROM.

Ex:- ROM is used in most computers to hold the basic input and output system (BIOS) so that the computer hardware such as hard disks, RAM, I/O ports and peripherals are recognized when the power is turned on.

- This is a non volatile memory that is the contents are not even when the power is turned off.

The ROM is categorized into following types.

- PROM (Programmable ROM)
- EPROM (Erasable PROM) → use of UV rays
- EEPROM (Electrically Erasable PROM) → use of electric pulses

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1) PROM (Programmable ROM)

- PROM is those in which the user can insert the content of choice only one.
- The user of this ROM can store programs on it using special tool.
- Once the empty ROM is programmed, it behaves like any other ROM, that is it cannot be rewritten.

2) EPROM (Erasable programmable Read only memory)

- This is a ROM which has not been pre recorded by the manufacturer but it supplied empty.
- In EPROM information can be erased and the chip can be programme to record different information.
- Eraser is archived by exposing the chip to ultraviolet light.
- EPROM is more expensive then PROM

3) EEPROM (Electrically erasable PROM)

- This is a ROM which has not been pre recorded by the manufacturer but it supplied empty.
- The user of this ROM can store programs on it using a special tool.

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- Once the empty Rom is programmed, It can be written repeatedly after erasing the previously written contents using electric charge.
- The ROM also allows erasing once byte at a time before writting the new content onto it.
- It is more expensive than PROM.

* Secondary Memory / Auxilary memory

- The secondary memory is the storage devices in which the data can be stored for longer duration and it is not lost even when the power is turned off. Therefore it is known as non volatile memory.
- This memory has greater storage capacity than the primary memory.
- It is less expensive but slow than the primary memory.

Most widely used secondary storage devices are :-

Magnetic Tape :

- magnetic tapes are used where large volume of data is stored for a longer time.
- It is sequential memory which contains thin plastic ribbon to [illegible] created by magnetic

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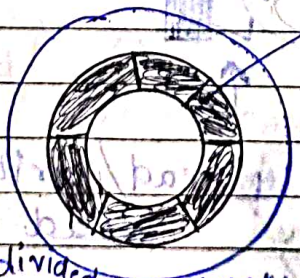
- In magnetic tape only one side of the ribbon is used for storing data.
- Data read / write speed is slower because of sequential access.
- It is highly reliable which requires magnetic tape drive for writing & reading data.
- The width of the ribbon varies from 4mm to 1 inch and it has storage capacity 100 MB to 200 GB.

Magnetic Disk:

- A magnetic disk is a type of secondary memory that is a flat disc covered with a magnetic coating to hold information.
- Magnetic disks are less expensive than RAM and can store large amounts of data, but the data access rate is slower than main memory.
- It also allows random access to data.

Architecture ⇒

- The entire disk is divided into 10 latters.
- Each tracks are further devided into sectors which are the smallest division in the disc.



Disc divided into tracks

Tracks divided into sectors

DVD
Digital versatile Disk

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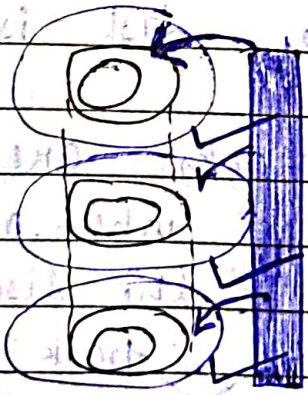
- A cylinder is formed by combining the tracks at a given radius of a disk pack.
- There exist a mechanical arm called as Read (write head).
- It is used to read form and write to the disk.
- Head has to reach at a perticula tracks and then wait for the rotat of the platter.
- The rotation causes the required sector of the track to come under the head.
- ~~Eo~~ Each platter has 2 surfaces top and bottom and both the surfaces are used to store the data.
- ~~Eoch~~ Each surface has its own read / write head.



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Optical storage:-

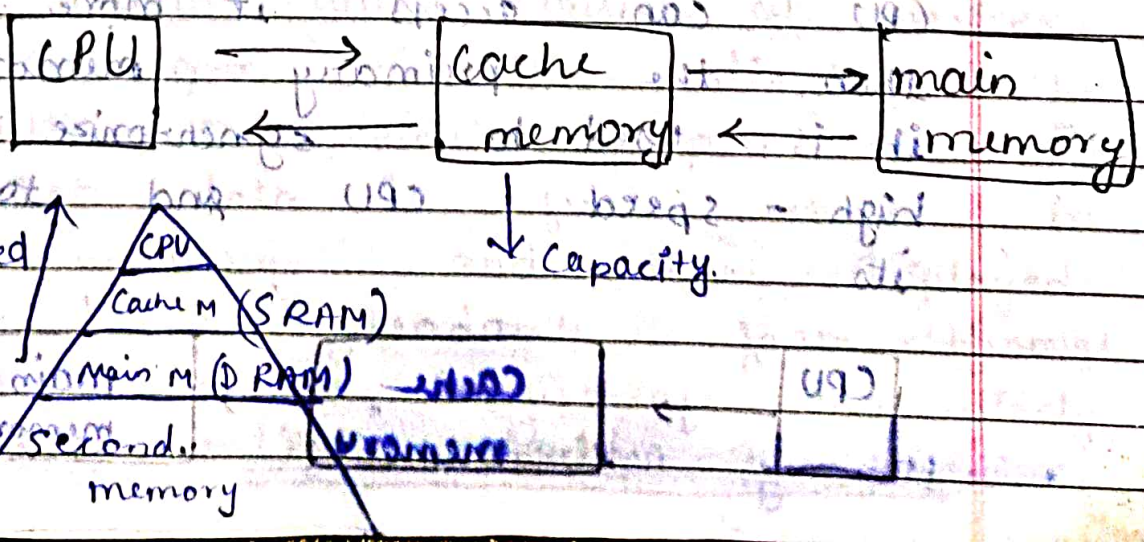
Optical storage is a storage medium that uses laser beam to record and retrieve digital (binary) data.

In optical storage technology a laser beam encodes digital data onto an optical or laser disc in the form of tiny pits arranged in a spiral tracks on the disk's surface.

* Optical storage provides greater memory capacity than magnetic storage.

Optical disks can be devided into the following categories.

1. CD-ROM (Compact Disk Read only memory)
2. WORM (Write once Read many)
3. DVD (Digital Versatile Disk).



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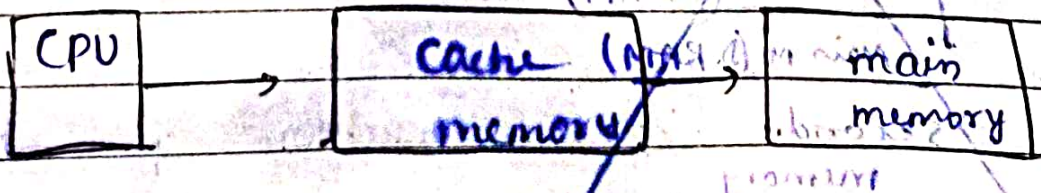
Cache Memory :-

1) It is a SRAM. Placed between the CPU and main memory.

2) When CPU needs any data or instruction for processing, it first searches in the cache memory. If required data or instruction is found in the cache memory, it is retrieved by the CPU for processing. Otherwise main memory is searched for the same information.

3) The most frequently used instruction and data are placed in the cache memory, therefore the overall speed of the computer is increased.

4) Cache memory is a high-speed memory which is small in size but faster than the main memory (RAM). The CPU can access it more quickly than the primary memory. So, it is used to synchronize with high-speed CPU and to improve its



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There are usually two types of cache memory found in the computer system.

Primary Cache / Level I (L1) cache / Internal cache:

The primary cache is located inside the CPU. It is smallest but fastest type of cache that provides quick access to the frequency accessed data by the CPU.

Secondary Cache / Level II (L2) cache / External cache:

The secondary cache is located outside the CPU. It is normally positioned on the motherboard of a computer. This cache is larger but slower than the primary cache.

* Output Unit :-

The output unit consists of devices that are used to display the results or output of processing. The output data is first stored in the memory and then displayed in a human-readable form through output devices. Some of the widely used output devices are monitor

printer and projector.

The output unit performs the following major functions.

Registers:

- CPU contains a few special purpose, temporary storage units known as registers.
- They are high speed memory locations used for holding instruction, data and intermediate results that are currently being processed.
- A processor can have different types of registers to hold different types of information.

Types of Registers:

- Program counter (PC) :- To keep track of the next instruction to be executed.
- Instruction Resisters (IR):- to hold instruction to be decoded by the control unit.
- Memory address Registers (MAR):- To

hold the address of the next location in the memory to be accessed.

- Memory Buffer Registers (MBR):- for storing data received from or sent to CPU.
- Memory Data Registers (MDR):- for storing operands and data.
- Accumulator (AC):- for storing the results produced by ALU.

IMP

* The Bus / system bus.

- A bus is a set of wires that is used to connect the different internal components of the computer system for the purpose of transferring data as well as addresses amongst them.

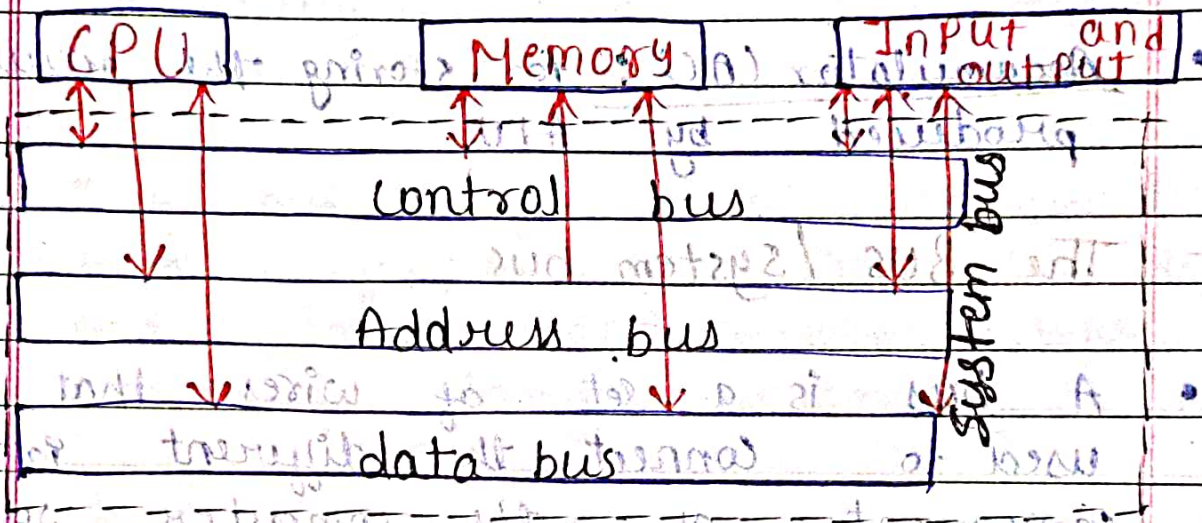
There may be several buses in the computer system. A bus can either be a

- Serial bus
- Parallel bus

(i) Serial bus:- In serial bus, only one bit of data is transfered at a time amongst the various

hardware components.

(ii) Parallel bus :- In parallel bus several bit of data can be transfered at a time amongst the various hardware components.



Types of system Buses :-

→ Data bus
→ Address bus
→ Control bus.

(1) Data Bus :-

- The data bus is used to transfer data or instruction between the CPU and memory unit of the computer.

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- It is bidirectional bus because it allows the transfer of data in both directions.
- When data is transferred from the CPU to memory, it is called "write" operation and when the data is transferred from memory to CPU, it is called the "read" operation.
- The data bus may have 8 bits, 16 bits or 32 bits width.
- The data bus is also shared by I/O devices of the computer system.

(2) Address Bus:-

- The address bus is also known as memory bus.
- It transfer the memory addresses for read and write memory operations.
- It contains a number of address line that determines the range of memory addresses that can be referenced using the address bus.

For example a 32 bit address bus can be used to reference 2^{32} memory location.

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- The address bus is unidirectional. However an address bus between processor and I/O system is bidirectional.
- It is used for transferring address between CPU and memory or input/output devices.

(3) Control Bus:-

- The control bus is bidirectional; it transmits commands signals from the CPU and response signals from the hardware.
- It helps the CPU synchronize its commands signals to the computer's components and slower external devices. As a result, the control bus consists of control lines that each send a specific signal, like read, write, and interrupt.
- The control lines that make up a control bus include system clock lines, status lines, and bytes enable lines.

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Instruction set

An instruction set can be defined as a group of instructions that a processor can execute to perform different operations. On that basis of complexity and the number of instruction used, the instruction set can be classified as;

- Complex Instruction set Computer (CISC)
- Reduced Instruction set computer (RISC)

(1) Complex Instruction set

- The complex set refers to the set of instructions that includes very complex and large number of instructions.
- Their number of instructions in this set varies from 100 to 250.
- The instruction in this set are mostly memory based instructions.
- These instruction in this instruction set have variable length instruction formate.

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- The execution of the instruction takes a lot of time because the instruction are memory based

- Reduced instruction set :- The reduced instruction set refers to the set of instructions that contains very less instruction ranging from 0 to 100.

- It comprises only those instruction that are frequently used by the processor for the execution of a program.

- The instruction used in this set are mostly registered based

- The instruction in this instruction set have fixed length instruction format.

classification of computer

1) Classification based on application
2) Classification based on size and capacity
3) Classification based on purpose

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① Classification based on application

- Analog
- digital
- Hybrid

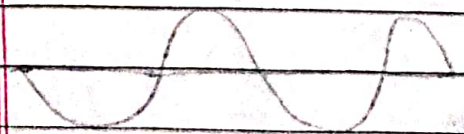
② Classification based on size and capacity

Digital computers

- Super computer
- mainframe
- mini
- micro

③ Classification based on purpose.

- General purpose computer
  - micro computer
- Special purpose computers
  - Super,
  - mainframe,
  - mini computer



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* Classification based on Application

Computer devided in three types on the basis of application.

1) Analog computer.
2) Digital computer.
3) Hybrid computer.

1) Analog computer :-

Analog computer are outlined to proc analog data. Analog data is continuous data that varies continuously and cannot have discr values. Analog computers are utilize primarily to measure physical units like the voltage, electric current, pressure, temperature and convert them into digits. Speedome mercury thermometer, thermometer Operational amplifier, electric integrators etc. are examples of analog computers.

like wave →

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2) Digital computers:-

The digital computer is outlined to execute calculations and logical operations at a high pace. Such computers are proficient in solving problems in discrete formate. It requires the raw data as input in the form of digits / binary numbers (i.e. 0 & 1) and processes it with programs stored in its memory to produced the output.

It can implement arithmatic operations such as addition, substraction, multiplication and division, and all sorts of logical / mathematical operations as well. All modern conputers like laptops, desktops including smartphones, calculators, tablets, digital watches, accounting machines, workstations, digital clocks etc that we use at home or office are digital computers.

Binary form → 1010100

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3) Hybrid Computer:

The Hybrid computers has the name signifying it exhibits features of both analog and digital computers. It is fast like analog computers and has memory and accuracy like those in digital computers. It can process both continuous and discrete data. It takes analog signals and transforms them into digital form before processing them.

Eg:- a petrol pump contains a processor that converts fuel flow measure into quantity and price.

→ Hybrid computer is used in hospitals to measure the heartbeat of the patient.

→ Hybrid computers are also used in scientific applications or in controlling industrial process.

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* Classification based on size and capability

1) Super computer.
2) Main frame computer.
3) Mini computers
4) Micro computers

1) Super computers :-

→ Super computers are the fastest, most powerful and most expensive computers

→ It has the ability to support several Giga Bytes of RAM.

→ Super computers have multiple processor (or CPUs) that process multiple instructions at a time

→ Super computers are widely used in scientific application such as - aerodynamic design and simulation, processing of geological data, weather forecasting, oil and gas exploration, molecular modeling, nuclear fusion research, cryptoanalysis

→ One of the most powerful super-computers today is Fugaku - Japan

super com. = as our ...
main frame = 1000 terminals
mini com. = 100 terminals.
micro com. = single terminal

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PARAM siddhi - AI, Pratyush, and Mihir etc.

These all are from INDIA

2) # Mainframe computer :-

→ mainframe computer is a category of the computer having larger size, fast processing and larger memory.

→ Mainframe computers are preferred for centralized location where its CPU is connected to ~~server~~ several terminals devices therefore permitting multiple user to share the single CPU.

→ It is mainly employed in the application where enormously high - speed processing is required like railway and airline reservation, banking and commercial application of large industries or companies where it can sit a machine of

transaction simultaneously.

(3) ~~Micro computer~~ Minicomputer :-

→ Minicomputers, computers that was smaller, less expensive, and less powerful than mainframe or super computer but more expensive and more powerful than personal computers.

→ Minicomputers were used for scientific and engineering computations, business transaction processing, file handling and database management.

(4) Micro Computer (PC) :-

→ A microcomputer is a small, relatively inexpensive computer with a micro-processor as its CPU. It includes a microprocessor, memory and I/O devices.

→ Its storing capacity is very less and speed is also slow as compared to mini, mainframe and super computers.

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→ Its data transfer rate is very slow.

→ These computers are used in schools, colleges, homes and offices.

Eg:- Desktop, Laptop, Notebook, tablet etc.

* Classification based on purposes-

(1) General purpose computers.
(2) Special purpose computers.

(1) General purpose computers :-

→ General purpose computer can do various everyday tasks such as writing a word processing letter, Documents preparation, recording financial analysis, printing documents, creating database, and calculations with accuracy and consistency.

→ The size, storage capacity and cost of such computers are mainly these computers is limited in

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performing specialized tasks.

Ex:- Desktops, laptops, smartphones, and tablets are used on daily basis for general purposes.

(2) Special Purpose computers:-

→ These computers are designed to perform a particular or specialized task.

→ The size, storage capacity and cost of such computers mainly depends on the nature and size of the work.

→ These Special Purpose Computer needs specific Input devices as well as a computer motherboard with the processor to conduct work efficiently.

→ These computers are used for special purposes in weather forecasting, space research, agriculture, engineering, satellite operation, traffic control etc.

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* Computer Software :-

→ Software is defined as a computer program which includes logical operation used for performing a particular task on a computer system using hardware components.

→ Types of Software :-

(1) • System software
(2) • Application software.
(3) • Utility programs

(1) System Software :-

→ System software refers to a program that manages and control hardware components of a computer system.

→ The system software is also responsible for handling the functionality of the application software on a computer system.

→ Eg:- Operating system, language processors, device drivers.

{ ① MS word
② MS power point
③ MS Access } → difference b/w them

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Application Software

Application Software is a computer program that is executed on the system software. It is designed and developed for performing specific tasks and is also known as end user program.

Some of the most commonly known application software:

Word processing software: MS word, Word Pad, Notepad

Spread sheet software: Excel, Lotus 1-2-3

Graphic, multimedia & presentation software: Power point, coreldraw, Paintbrush

Database software: MS access, ORACLE, Fonpro.

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(3) Utility programs :-

→ The utility software is system software that helps to maintain the proper and smooth functioning of a computer system. It assists the operating system to manage, organise, maintain and optimize the functioning of the computer system.

→ Utility : software performs certain tasks like virus detection, installation and uninstallation, data backup, detetation of unwa files etc. some examples are antivirus : software, file management tools, comparission tools, disk management tools etc.

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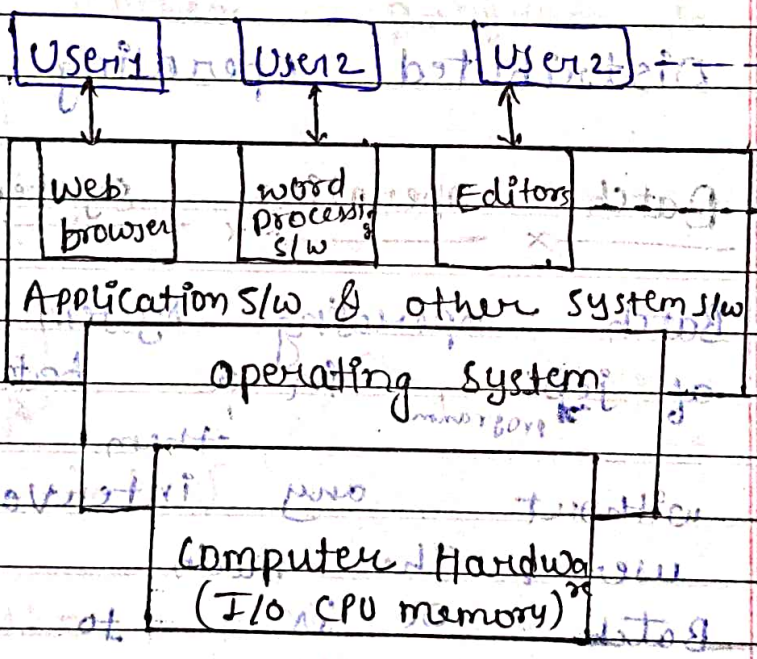
Operating system :-

→ An operating system (OS) is a collection of software that manage computer hardware resources and it provides common services for computer program.

→ An operating system is a software that acts as an interface b/w computer hardware and the user.



Jobs → Prog

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* Types of operating system :-

(1) Batch (so) processing system. (2nd gener)
(2) Multiprogramming system (3rd gener)
(3) Time sharing system. (4th gen)
(4) Real time operating system (4th gener)
(5) Network operating system
(6) Distributed operating system

(1) Batch operating system :-

Batch operating system take a sequence of jobs (programmes) in a batch and executes them one by one without any intervention of the user. The main advantages of Batch OS is to increase the CPU utilization.

* Disadvantages :-

→ No interactive enviroment
→ CPU idle time is longer.
→ Lack of Interaction between user & Jobs

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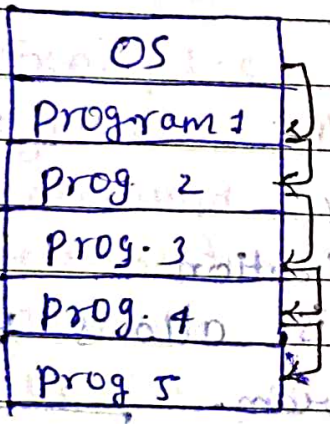
(2) Multiprogramming systems :-

→ Multiprogramming OS can run many programs on a single processors

→ Multiprogramming systems keeps the several programs in memory simultaneously. The OS selects one program in the memory and execute

If program may have to wait for some task such as I/O operations. The OS switches to an another program & so on.



Main memory (MM)

* Advantages :-

→ High CPU utilization as it is never idle
→ Sufficient memory utilization.
→ More CPU throughput.

* Disadvantages.

→ Lack of interaction b/w users & programs
→ CPU scheduling is required

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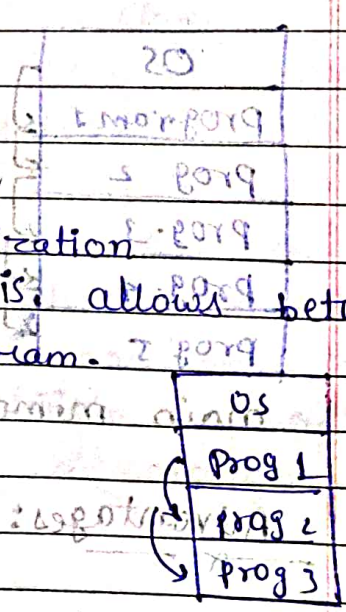
(3) Time sharing system :-

→ Time sharing systems are interactive system that allows users to interact with a system through OS commands.

→ In this system CPU executes multiple programs by Switching among them.

→ Each interactive user is assigned a time slice in a round robin manner during which it controls the CPU.



→ Advantage:

→ Increased throughput.

→ Increased CPU utilization.

→ User interaction is allows between execution of program.

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(4) Real time operating system (RTOS)

→ These are used in environments where a large number of events, mostly external to the computer system, must be accepted and processed in a short time or within certain deadlines.

→ The processing in this type of system must occur within the specified constraints. Otherwise, this will lead to system failure.

→ Examples of real time operating systems: Airline traffic control system, command control systems, Airlines reservation system, Heart pacemaker, network multimedia systems, Robots etc.

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V. Imp

* Functions of (OS) operating system :-

→ OS functions can be categorized into 5 major types :-

(1) Process Management
(2) Memory Management / Main memory
(3) I/O device Management
(4) File Management
(5) secondary storage Management

(1) Process Management :-

The following activities are performed by operating system for process management :-

→ Keeps tracks of the status of process

→ creating and deleting both user and system processes.

→ suspending and resuming processes

→ Providing mechanism for process synchronization and communication.

→ It allocates the CPU and deallocates the processor when it is not required.

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UNIT I

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Algorithm:

(i) An algorithm is a well defined list of steps of formatisolving a particular problem.

(ii) The algorithm gives the logic of the program. i.e. a step by step description of how to arrive at a sol?

(iii) An algorithm has a finite no. of steps.

(iv) An algorithm must have the following characteristics:

(a) The algorithm should be clear and unambiguous.

(b) An algorithm should have well defined inputs.

(c) An algorithm should have one or more outputs.

(d) An algorithm must be finite i.e. it should terminate after a finite time.

key feature of algorithm

→ Sequence based

→ Decision based

→ Repitation based.

sequence means that each step of algorithm is executed in the specified order.

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→ Sequence based:

→ Write an algorithm to find out sum of two numbers?

Step-1 :-

Start

Step-2 :-

Input first number as a variable A.

Step-3 :-

Input second no. as a variable B

Step-4 :-

Set Sum = A+B

Step-5 :-

Print the value of "Sum"

Step-6 :-

End.

→ Write an algorithm for swapping two values.

Step-1 :- Start

Step-2 :- Take a variable Temp.

Step-2 :- Input first no. as a variable A

Step-3 :- Input second no. as a variable B

Step-4 :- Temp = A (set)

Step-5 :- A = B (set)

set

Step-6 :- V B = temp

Step-7 :- Print the value of A & B

Step-8 :- End.

→ Write an algorithm to find out the simple interest.

$I = \frac{T \times I \times P}{}$

→ Write an algorithm to convert temperat in feranite to celcius.

$F = \frac{9°c + 32}{6}$

$C = 27J - F$

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Decision based algorithm :-

Decision statements are used when the outcome of the process depends on some condition.

Ex:- Write an algorithm to find out the given no is even or odd.

Step-1 Start.
step-2 Input A.
step-3 Check if $(A \% 2 == 0)$ then goto step-4 otherwise step-5
Step-4 Print "even no".
step-5 Print "odd no".
Step-6 End.

Q. Write an algorithm to find out the largest of three no.

Step-1 Start.
Step-2 Input A.
Step-3 Input B
Step-4 Input C.
Step-5 Check if $(A > B)$ then go to step-6 otherwise step-8
step-6 check if $(A > C)$ then go to step-7 otherwise Step-10
step-7 Print A
Step-8 Check if $(B > C)$ then go to step-9 otherwise step-10
Step-9 Print B
Step-10 ~~Check if (C > B)~~ Print C
Step-11 End.

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Q Write an algorithm to print the sum of first N natural numbers.

Step-1 Start.
Step 2 - set I = 1, N = 10, sum = 0
Step 3 - Repeat step ④ and ⑤ till I <= N
Step 4 - Set sum = sum + I
Step 5 - set I = I + 1
Step 6 - Print "sum"
Step -7 End.

Q Write an algorithm to print the sum of even no. from 1 to 20.

Step-1 Start
Step-2 Set, I = 1, sum = 0
Step-3 Repeat step ④ and ⑤ till I <= 20
Step 4 - If the no. is (n % 2 = 0) then sum = sum + n
Step 5 - Set I = I + 1
Step-6 Print "sum"
Step-7 End

IMP

Complexity of an algorithm :-

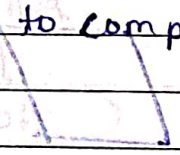
The complexity of an algorithm is the function which gives the running time and space for space in terms of the input size.

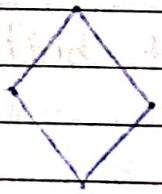
There are two types of algorithm complexity.

(1) Space complexity
(2) Time complexity

(1) Space complexity :- It is the amount of memory which is needed by the algorithm to run to completion.

(2) Time complexity :- It is the amount of time which is needed by the algorithm to run to completion.





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Flowchart :-

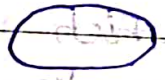
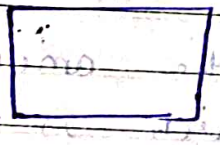
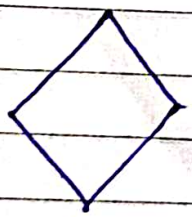
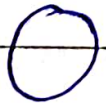
Flowchart is a graphical representation of a progr

① → It is easier for a programmer to explain the logic of a program

② → Flowcharts are language independent

→ Flowchart uses the simple symbols that have standardsed meaning to denote diff types of instr.

→ Flowchart symbols :-

	symbol	symbol name	purpose
①		Start / stop	This symbol denotes the beginning and end of the algorithm
②		process	To represent processing operations performed of the instructions
③		Input / output	This symbol denotes program inputs & outp
④		Decision	This symbol represent point in a program where a decision is mad
⑤		Flowlines	This symbol denotes rel -tionships blw diff shapes
⑥		On page connector	This symbol Connects two or more parts of a flowchart which are on the

⑦		off Page connector	This symbols connect two parts of a flowchart which are spreads over diff. pages.

Problems :-

Q.(1) Draw a flowchart to calculate the avg. of two no.

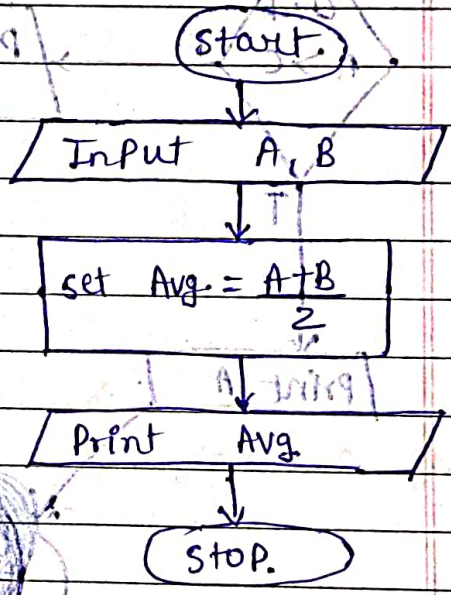
Step-1- start

Step-2- set A, B.

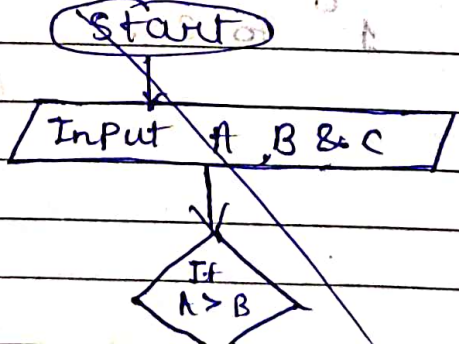
Step-3- set Avg. = $\frac{A+B}{2}$

Step-4- Print Avg.

Step-5- Stop.



Q.2 Draw a flowchart to find the largest of three numbers.



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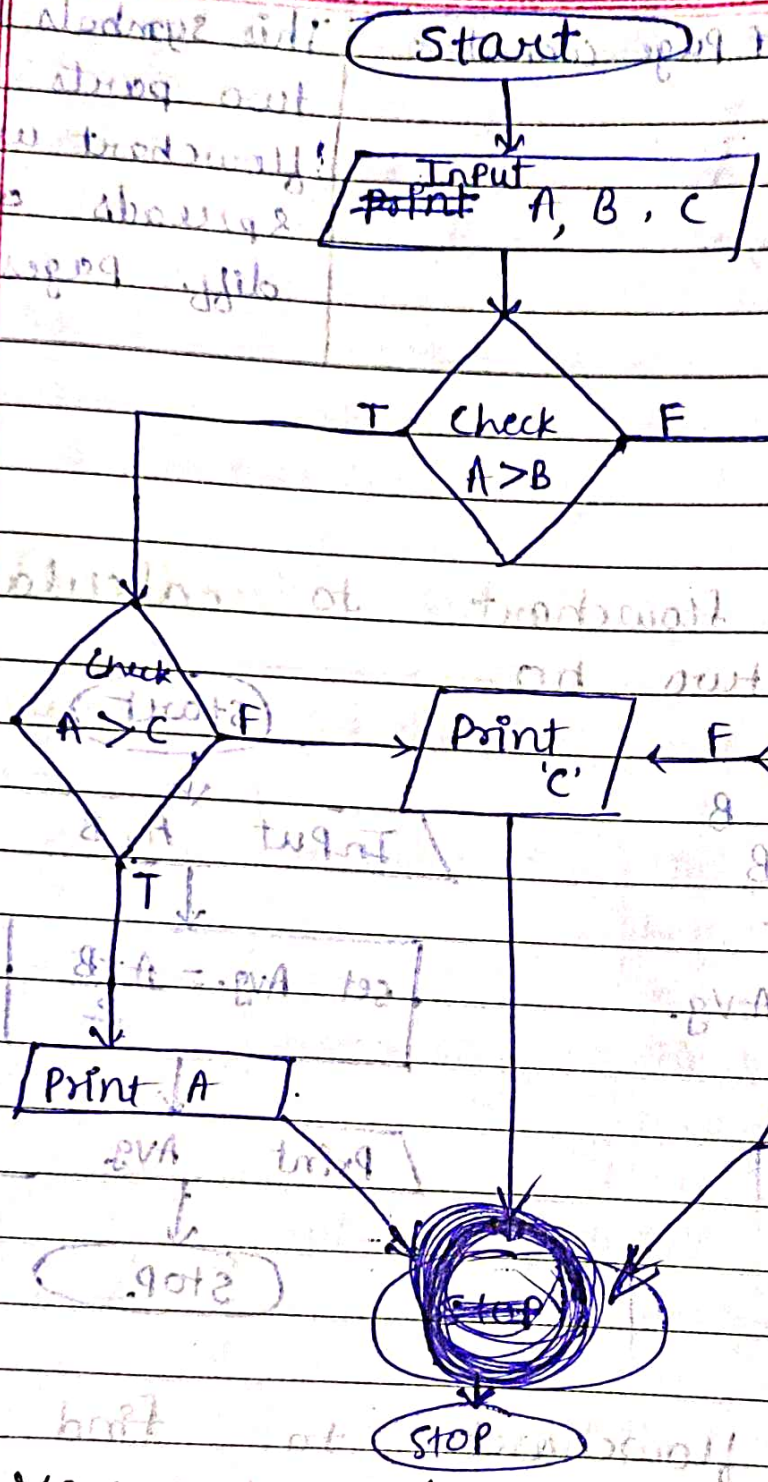
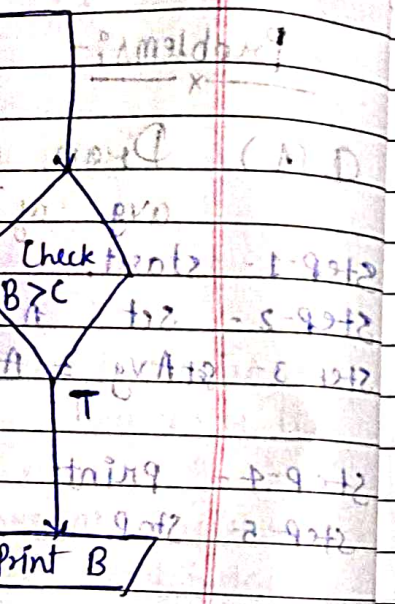
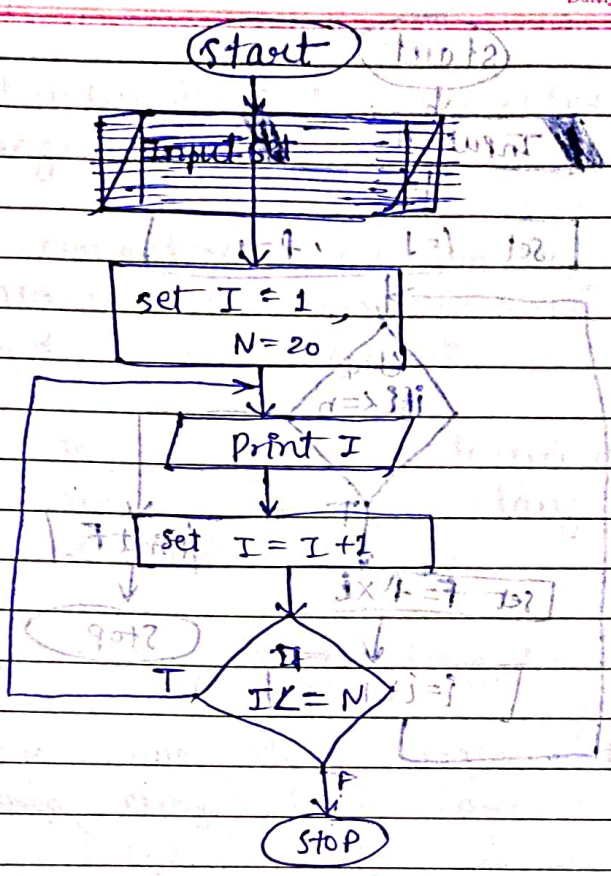


Q.3 Draw a flowchart to print the numbers b/w 1 to 20.



the numbers



Q. write a algorithm & Draw a flowchart to find a factorial of a given no.

step 1	Start,
step-2	Input n
step-3	set i = 1 , f = 1
step-4	Repeat steps ⑤ and ⑥ while i<=n
step-5	set F = f * i
step-6	set i = i+1
step-7	print 'F'
step-8	End.

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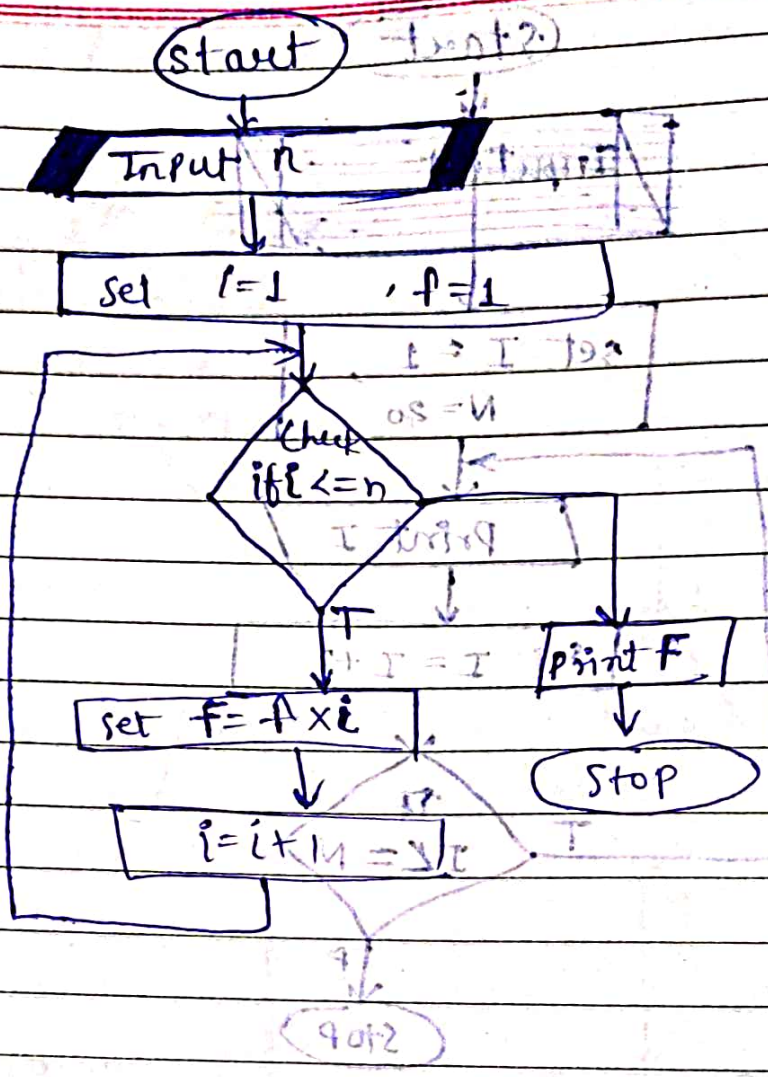

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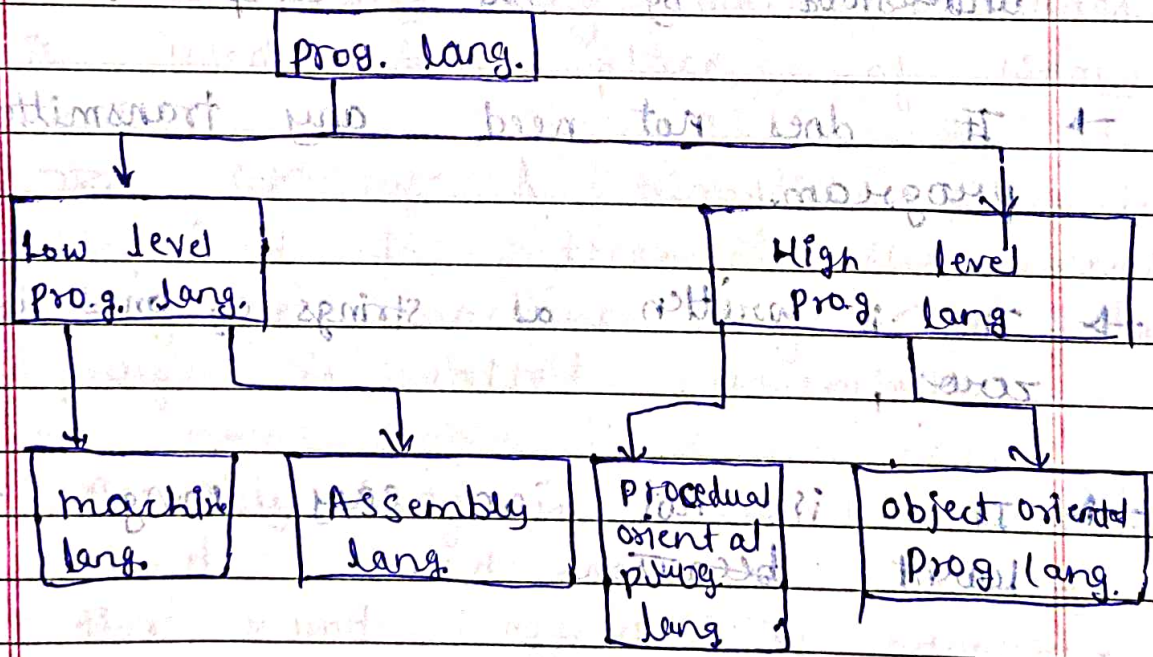
* Introduction of computer programming Languages.

→ A computer programming lang. is a means of communication b/w user and computer.

→ It is a set of instructions written in any specific lang. to perform a specific task.

Types of prog. lang.:

→ There are two major types of comp. prog. lang. are



ex:- C, Basic, C++, Java, Cobol, fortran, Python

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Low level prog. lang. :

→ Low level lang. is machine dependent prog. lang.

→ Thus, processor runs low level prog. without the need of compiler or interpreter so, the programs return in the low level lang. can be very fast.

→ It is further devided into 2 catagories

(i) Machine lang. :-

(ii) Assebly lang. :-

(i) Machine lang :-

→ It is only lang. that is directly understood by the computer.

→ It does not need any transmitter program.

→ It is written as strings of ones and zeros,

→ It is not easy lang. to learn because

→ Programs of machine lang. runs very fast because no translator prog required.

mnemonics codes

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→ Disadvantages of machine lang.

(i) It is very difficult to make prog. in machine lang. The programmer has to no details of hardware to write a prog.

(2) The programmer has to remember a lots of codes to write a prog. which results in prog. error.

(3) It is difficult to debug a prog.

(ii) Assembly lang.:-

→ In Assembly lang mnemonics codes is used in place of binary code.

→ A translater prog is required to translate the assembly lang. to machine lang. The translater prog. is called assembler.

→ Assembly lang. is easier to understand and save a lot of time & effort of programmer.

→

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→ Disadvantages :-

(1) It is machine independent lang. A program written for one computer might not run in other computer with diff hardware config.

High level lang.

⇒ High level lang. are simple lang. that use english and mathematical symbols for its prog construct.

→ High level lang are problem oriented lang because the instruction are suitable for solving a particular problem.

→ It is indipendent of the machine on which it is used.

→ Prog written in high level lang. can be translated into machine lang and therefore can run on any computer.

→ It is easier to correct errors and modify prog. Instructions.

→ difference

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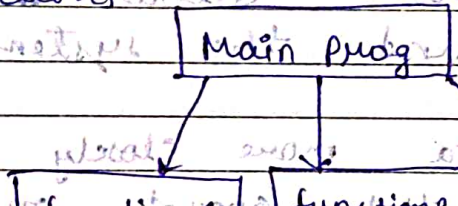
⇒ High level prog. approaches are broadly classified into two categories.

① procedural oriented prog. approach.
② object oriented prog. approach.

(1) procedural oriented prog. approach:

→ In procedural the problem is viewed as a sequence of things to be done such as reading, calculating & display output results.

→ In large programs are devided into small programs called functions.



→ In procedural data moves openly around the system from function to function.

→ function transform data from one form to another.

→ It follows top - down approach in prog designing. ex: C, fotran, basic

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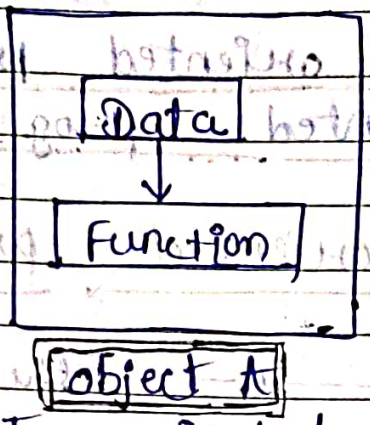
(2) object oriented programming approach



→ In object oriented prog. all the application is built around the classes and object.

→ (OOP) → treats data as a critical element in the prog. development and does not allow it to flow freely around the system.

→ It ties data more closely to the functions that operate on it and protect it from accidental modification from outside functions.

→ Object oriented prog. allows decomposition of a problem into a no. of entities called objects and it then may data and functions around these objects.

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→ data of an object can be access only by the functions associated with that object. Function of one object can access the function of other object

→ It follow bottom-up approach in prog designings

Ex:- C++, Java, Python, Java script, Perl etc.

C++

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Introduction to C++ prog lang

C++ is an enhanced version of C language.

★ Structure of C++ Prog

→ Preprocessor directives

```
#include<iostream.h>
```

C in, C out } objects

```
[Global variables declaration (if any)] int
[Global constant]  const S=10;  #define S
int main ()
{
   local variable declaration
   statements;
   return 0;
}
```

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```
#include <iostream.h>
int main ()
{
int a,b,c;        → identifier
cout << "my first c++ program \n";
cout << "Enter the values of a&b";
cin >> a >> b;
c = a + b;        → operator
cout << "c=" << c;
return 0;
}
```

(*) Basic terminology of c++ lang:

(1) Character set:- The c++ character set is a set of valid character that the lang can recognised. It consist of the following characters

→ Letters:- A-Z, a-z

→ digits:- 0 to 9

→ Special symbols:- +, -, *, /, (), [], %, etc

→ White space:- space, horizontal tab, vertical tab, newline.

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(2) Token :- The smallest individual unit of a C++ program is known as a token. C++ has the following tokens.

- Key words → cin, cout, if, main, for, else ....
- Identifiers → int (i, j, k); , char (ch); fag()
- Literals / constant → #define i=10;) const int i=
- Separators → ; , (), *, [], .
- operators

- Key words :- In C++ keywords are the reserved words that have special meaning to the long compiler. They cannot use as identifier in your program.
- Identifiers :- Identifier are used to represent the names of variables, classes, functions, constants etc starting with alphabets only.
- Literals / constants :- Literals are the fixed data values that never change their value during the execution of a program.
- Separators :- In C++ some characters that are used as a separators.

; , ( ) , [ ] , . , { }

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→ Operators :- Operators are special symbols that perform mathematical or logical operations.

① Arithmatic operators

operator	meaning	Associativity
+	Addition	Left to right
-	subtraction	—11—
*	Multiplication	—11—
/	Division	—11—
%	Modular division	—11—
- (unary)	unary subtract	Right to left

② Relational operators :-

operator	meaning	Associativity
<	less than	left to right
<=	less than & equal to	—11—
>	greater than	—11—
<=	greater than & equal	—11—
==	equal to	—11—
!=	Not equal to	—11—

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Logical operators :-

Operators	memory	Associativity
&&	Logical AND	Left to right
||	Logical OR	— " —
!	Logical NOT	Right to left

Increment & decrement operators :-

operator	memory	Associativity
++	Increament	Right
--	Decrement	- left

Conditional operation :-

operator	memory	Ass
Condition ? Result 1 : Result 2		Right to left

a > b ? a : b

<< insertion operator
>> extraction operator

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→ Size of operator :-

Operator	memory	Associativity
size of ()		Right to left

```
#include<iostream.h>
#include<conio.h>
int main ()
{
  int a, b, c, x, y, z; a1, b1, c1;
  cout << "Enter the value of a & b";
  cin >> a >> b;
  c = a+b;
  x = a-b;
  cout << "c=" << c;
  cout << "x=" << x;
  a++;
  cout << "a=" << a;
  y = a--;
  cout << "y=" << y;
  z = y + a++;
  cout << "z=" << z;
  z = size of (int);
  cout << "z=" << z;
  a1 = 25;
  b1 = 31;
  c1 = a1 > b1 ? a1 : b1;
```

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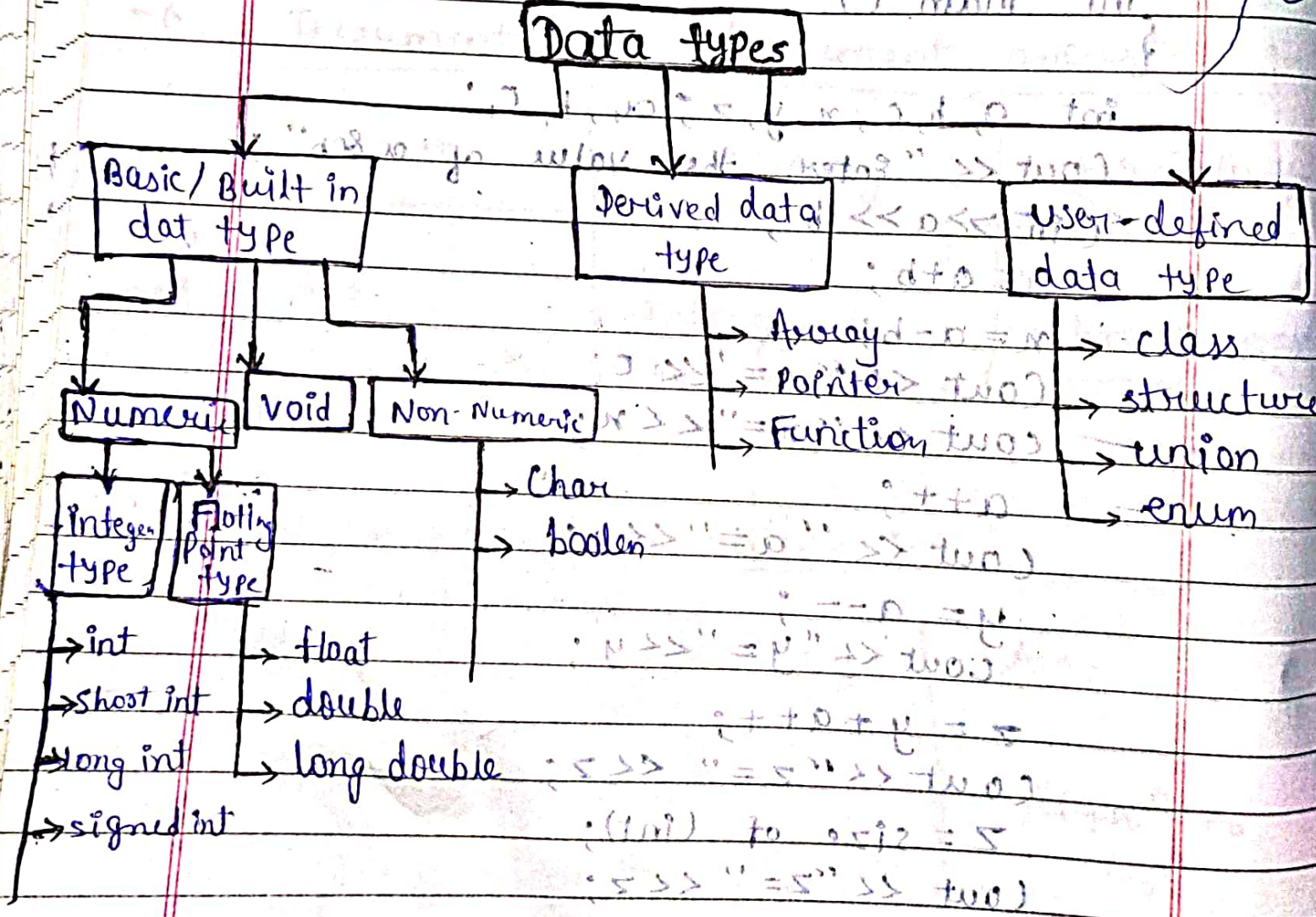
cout << " C1 = " << C1;
}

* Data types:-

Data type specified the size and type of the values that can stored in computer memory. There are following types of Data types used in C++ lang.



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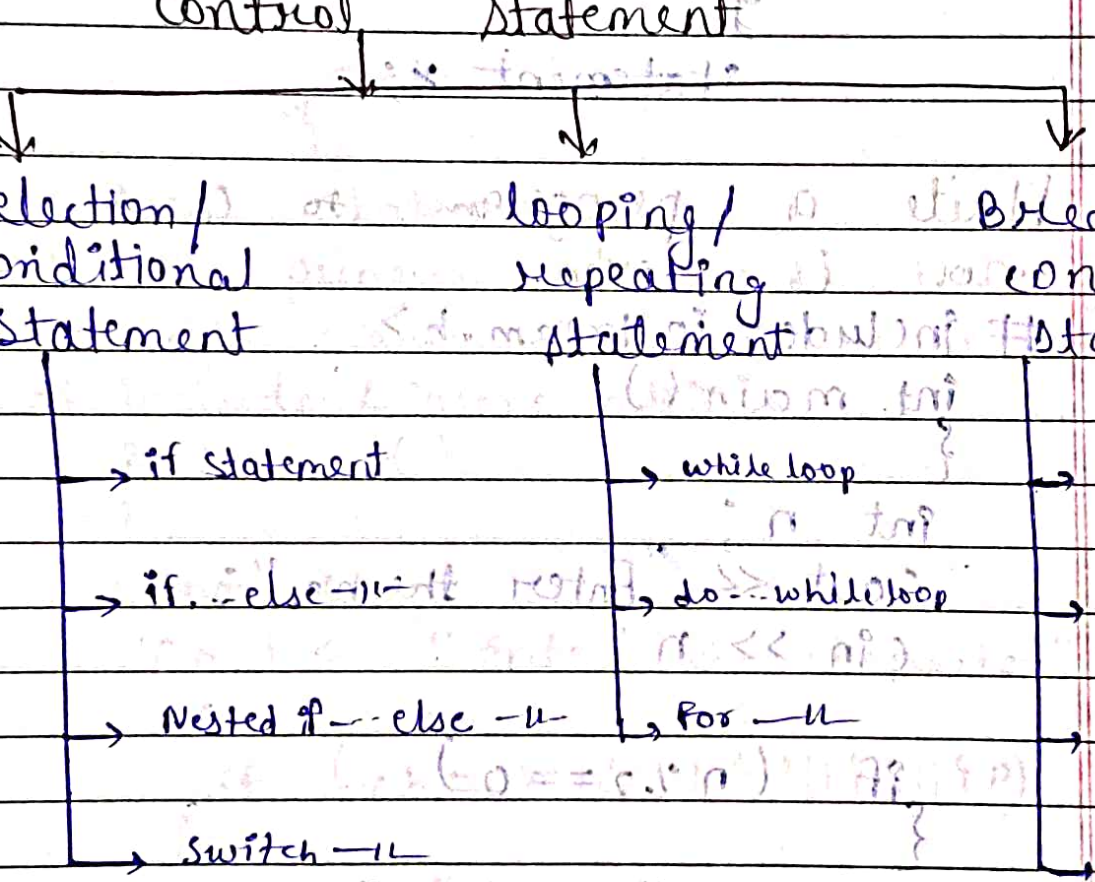
* Control Statements :-

→ Control statements are the statements that controls the flow of the program in order to execute the set of instructio

→ Contro statements can be classified into three categories

(1) Selection / conditional statements
(2) looping / repeatition statements.
(3) Breaking control statements.



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* If statement:-

If statement is used to execute a statement or set of statement only if a condition is fulfill.

Syntax:-

```
If (condition)
{
statement 1;
statement 2;
---
}
statement x;
```

* Write a program to check the given no. is even.

```
#include<iostream.h>
int main()
{
int n;
cout << "Enter the no.";
cin >> n;
if (n%2==0)
{
cout << "even no.";
}
cout << "NO. is not even";
return 0;
}
```

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* If .... else... statement :-

→ In If else statement, if the condition is true then the statement of "if" blocks are executed otherwise else statement of "else" are executed

Syntax :-

```
If (condition)
{
statement 1;
}
else
{
statement 2;
}
statement x;
```

→ Write a program to check the given character are vowel or consonents

```
# include <iostream.h>
int main ()
{
char, ch;
Cout << "Enter the character";
Cin >> ch;
if (ch == 'A' || 'E' || 'I' || 'O' || 'U')
{
Cout << "Character are vowel";
}
else
```

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```
{
cout<<"Characters are consonant";
}
return 0;
}
```