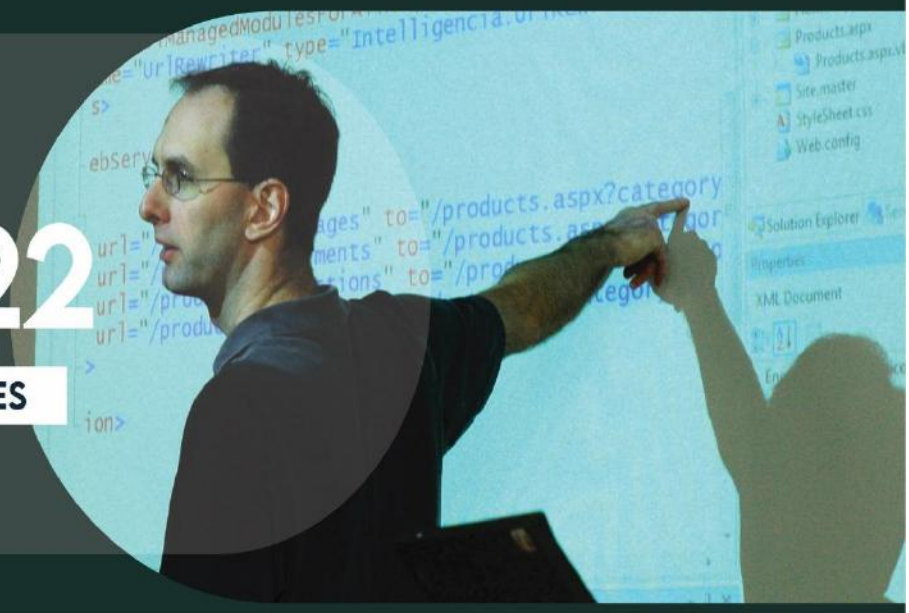
INFUSION NOTES
WHEN ONLY THE BEST WILL DO



2021-22

HANDWRITTEN NOTES

LATEST EDITION

राजस्थान कंप्यूटर अनुदेशक (शिक्षक)

COMPUTER INSTRUCTOR

{Part- 3}

Computer Study -1

COMPUTER STUDY – 1

1. Fundamentals of Computer :
    - Overview of the Computers System including Input/ Output Devices
    - Pointing Devices and Scanner
    - Representation of Data (Digital VS Analog, Number System – Decimal, Binary & Hexadecimal)

2. Data Processing
    - Introduction to Data Processing
    - Concepts of Files and it's types
    - Word Processing (MS- Word)
    - Spread Sheet Software (MS-Excel)
    - Presentation Software
    - (MS-Powerpoint)

3. DSA (Data Structure And Algorithms)

- Algorithms for Problems Solving
- Abstract Data Type
- Arrays as Data Structures
- Linked lists VS Array for storage
- STACK and it's operations
- Sorting andSearching
- Symbol Table
- Data Structure using C and C++.

4. Computer Organization and OS

- Basic Structure of computers
- Computer Arithmetic operations
- CPU and Instruction
- Memory Organization I/O Organizaton
- Operating Systems Overview

- Process Management
- Finding and Processing Files.

नोट -

प्रिय छात्रों, Infusion Notes के राजस्थान कंप्यूटर अनुदेशक के sample notes आपको पीडीऍफ़ format में "फ्री" में दिए जा रहे हैं और complete Notes आपको Infusion Notes की website या (Amazon/Flipkart) से खरीदने होंगे जो कि आपको hardcopy यानि बुक फॉर्मेट में ही मिलेंगें, या नोट्स खरीदने के लिए हमारे नंबरों पर सीधे कॉल करें (8233195718, 9694804063) । किसी भी व्यक्ति को sample पीडीऍफ़ या complete Course की पीडीऍफ़ के लिए भुगतान नहीं करना है । अगर कोई ऐसा कर रहा है तो उसकी शिकायत हमारे Phone नंबर 8233195718, 0141-4045784 पर करें, उसके खिलाफ क़ानूनी कार्यवाई की जाएगी ।

Chapter - 1

Fundamentals Of Computer

Overview :-

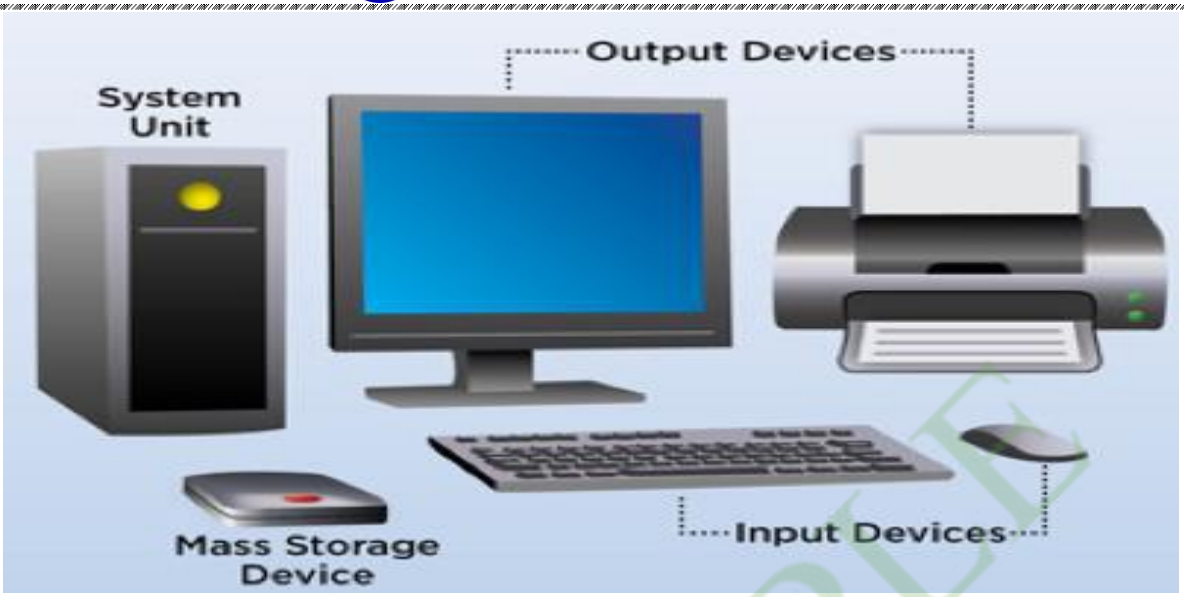
Introduction of a Computer system

Dear aspirants, A computer is an electronic device that accepts information (Data), processes it according to specific instructions, and provides the results as new information.

We describe our definition of computer by its working way facts

A computer system is made up of both hardware and software components. At a fundamental level, computers operate through these four function which are –

I. **Input**: The transfer of information into the system (example- through a keyboard).
II. **Output**: The presentation of information to the user (example- on a screen).
III. **Processing**: The retrieval or manipulation of information into a new form (example- results from a search engine).
IV. **Storage**: The storing or preservation of information for later use (example - files stored on a hard drive).



Characteristics of computer system : –

1. Speed of Computer

I. We know computer can work very fast. It takes only few seconds for calculations that we take hours to complete.

II. It can perform millions of instructions and even more per second.

III. Therefore, we determine the speed of computer in terms of microsecond (10-6 part of a second).

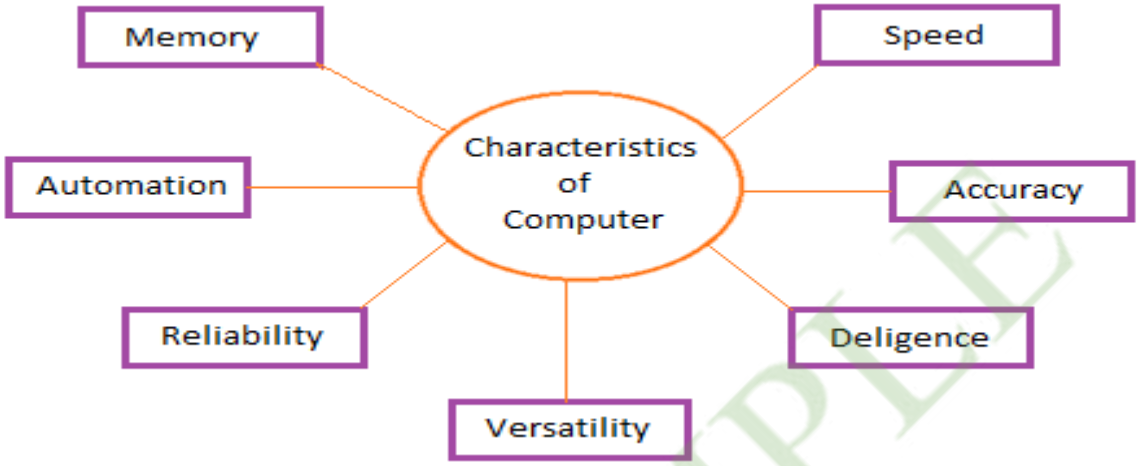
2. Accuracy of computer: –

I. Computers not only provide incredible speed, instead, they are also capable of consistently working with accuracy.

II. The degree of accuracy in computers is very high.

III. It can perform calculations at almost 100% accuracy.

IV. Errors may occur in a computer system, but only because of wrong human input or inaccurate data.



3. Diligence of computer: –

I. A computer is never tired. It is free from tiredness, lack of concentration, fatigue, etc. It can work for hours without creating any error.

II. If millions of calculations are to be performed, a computer will perform every calculation with the same accuracy.

III. Due to this capability it overpowers human being in routine type of work.

4. Versatility of computer: –

I. **Versatility** means that the computer has the ability to perform completely different kinds of works with the same accuracy and efficiency at the same time.

II. It is not just a calculating machine anymore.

III. Computers are very versatile. The same computer can be used for various applications. For instance, you -

a. can use a Personal Computer (PC) to prepare a latter, prepare the balance sheet of a company.

b. store a database of employees, produce a professional-looking advertisement, send or receive fax messages.

c. for a computer to perform a new job, all it needs is a program. (A program is a set of instructions.

d. that enables a computer to do a particular task.) Thus, if you want a computer to do perform a new task .

e. all you need to write a new program for that task.

5. Power of Remembering : –

I. Computer has the power of storing any amount of information or data.

II. Any information can be stored and recalled as long as you require it, for any numbers of years.

III. It depends entirely upon you how much data you want to store in a computer and when to lose or retrieve these data.

6. No IQ / Dumb machine: –

I. Computer is a dumb machine and it cannot do any work without instruction from the user.

II. It performs the instructions at tremendous speed and with accuracy. It follow all the instruction which you want to be perform.

III. So a computer cannot take its own decision as we can.

7. No Feeling/ It has No Emotions: –

I. It does not have feelings or emotion, taste, knowledge and experience. Thus it does not get tired even after long hours of work.

8. Storage of computer: –

I. The Computer system has an in-built memory where it can store a large amount of data.

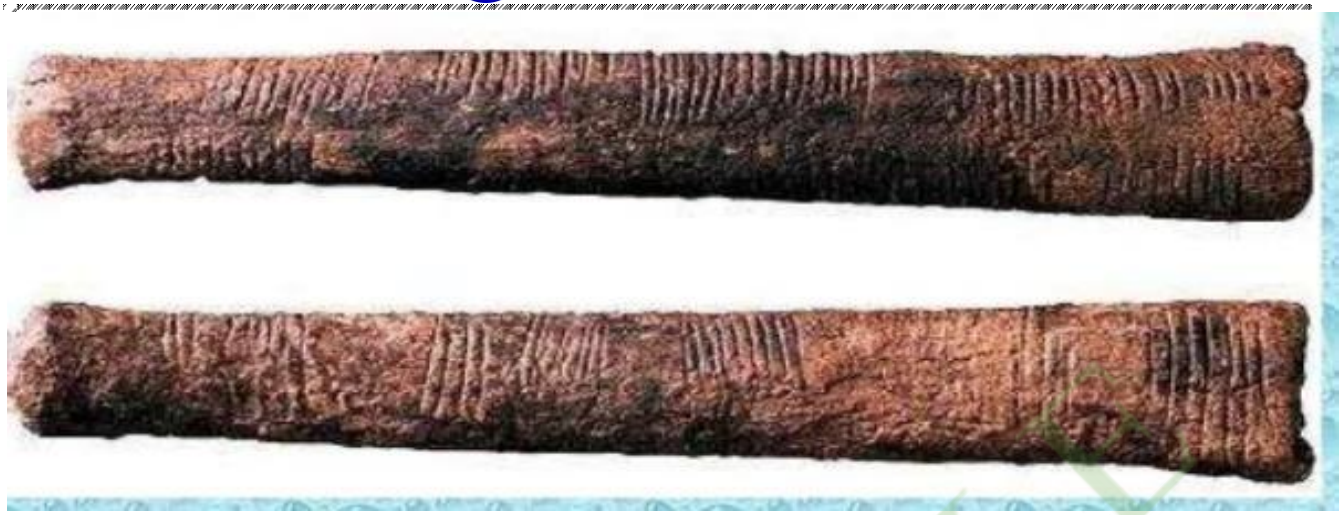
II. You can also store data in secondary storage devices such as floppies, pen drives, CD, DVD etc. which can be kept outside your computer and can be carried to other computers.

About the history of computer –

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 to be used in that sense until the middle of the 20th century.

Tally Sticks

A tally stick was an ancient memory aid device to record and document numbers, quantities, or even mess



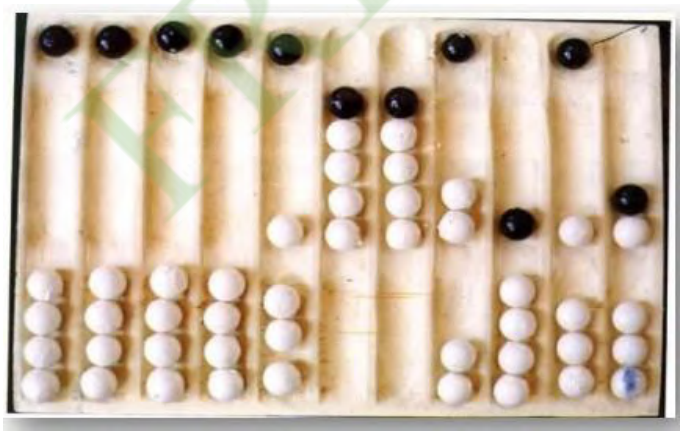
Abacus

I. An abacus is a mechanical device used to aid an individual in performing mathematical calculations.

II. The abacus was invented in Babylonia in 2400 B.C.

III. The abacus in the form we are most familiar with was first used in China in around 500 B.C.

IV. It used to perform basic arithmetic operations .



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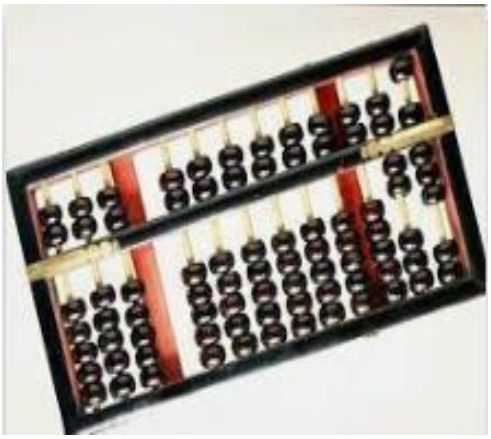
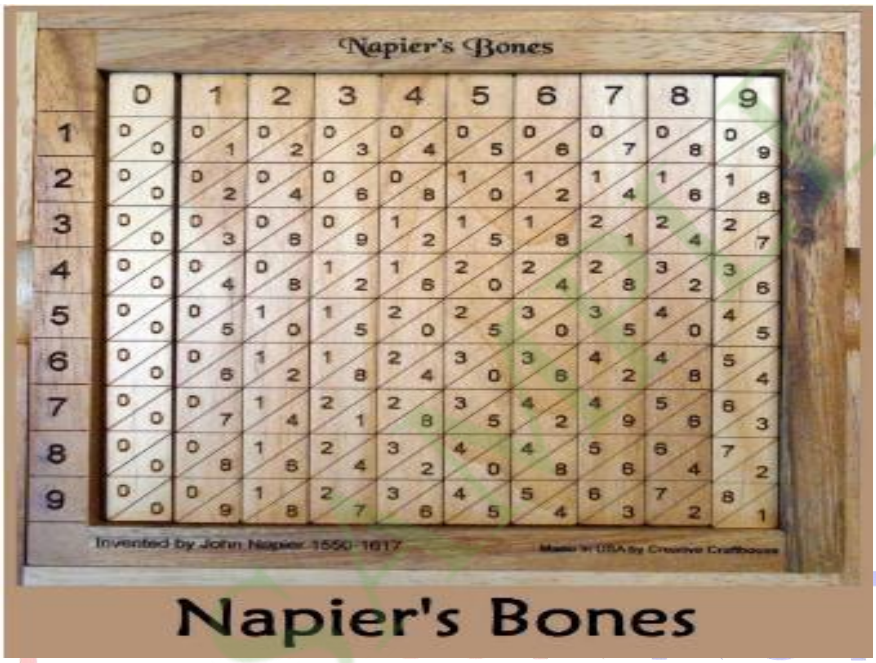


Modern

Napier's Bones -

I. Invented by John Napier in 1614.

II. Allowed the operator to multiply, divide and calculate square and cube roots by moving the rods around and placing them in specially constructed boards.



The Sliderule(1621)

I. Napier invented logarithms in 1614, Edmund Gunter invented the logarithmic scales (lines etched on metal or wood).

II. William Oughtred invented the sliderule in 1621 in England. Using the concept of Napier's bones, he inscribed logarithms on strips of wood and invented the calculating "machine".

III. His calculating machine was used up until the mid-1970s when the first hand-held calculators and microcomputers appeared.

Blaise Pascal(1623-1662)

I. Blaise Pascal, was a French mathematical genius, at the age of 19 he invented a machine, which was called the Pascaline that could do addition and subtraction to help his father.

II. His father was was also a mathematician. Pascal's machine consisted of a series of gears with 10 teeth each.

It represents the numbers 0 to 9. As each gear made one turn it .....

नोट – प्रिय पाठकों , यह अध्याय अभी यहीं समाप्त नही हुआ है यह एक सैंपल मात्र है / इसमें अभी और भी काफी कंटेंट पढ़ना बाकी है जो आपको **राजस्थान कंप्यूटर अनुदेशक (शिक्षक)** के इन कम्पलीट नोट्स में पढ़ने को मिलेगा / यदि आपको हमारे नोट्स के सैंपल अच्छे लगे हों तो कम्पलीट नोट्स खरीदने के लिए हमारे संपर्क नंबर पर कॉल करें , हमें पूर्ण विश्वास है कि ये नोट्स आपकी **राजस्थान कंप्यूटर अनुदेशक (शिक्षक)** की परीक्षा में पूर्ण संभव मदद करेंगे , धन्यवाद /

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- ***Computer generations***

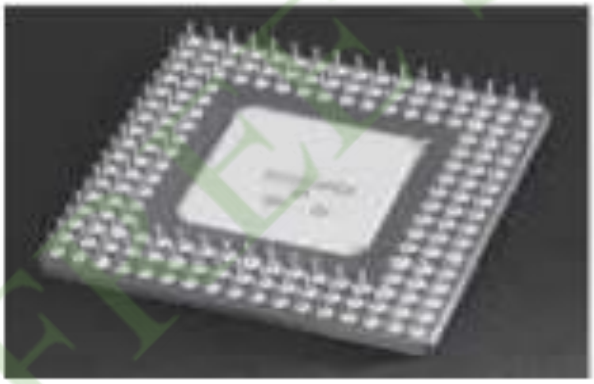
Basic Terms -

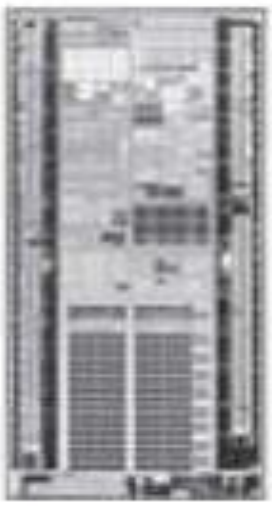
A. Vacuum tube – *An electronic device that controls the flow of electrons in a vacuum. It used as a switch, amplifier, or display screen in many older model radios, televisions, computers, etc.*

B. Transistor – *An electronic component that can be used as an amplifier or as a switch. It is used to control the flow of electricity in radios, televisions, computers, etc.*

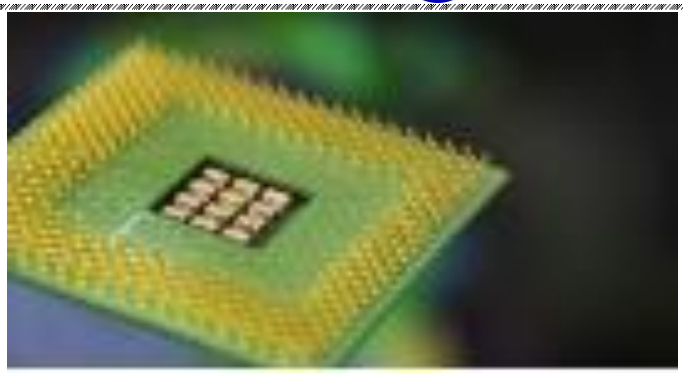
C. Integrated circuit (IC) – *A small electronic circuit printed on a chip (usually made of silicon) that contains many its own circuit elements (e.g. transistors, diodes, resistors, etc.).*

D. Microprocessor – *an electronic component held on an integrated circuit that contains a computer's central processing unit (CPU) and other associated circuits.*

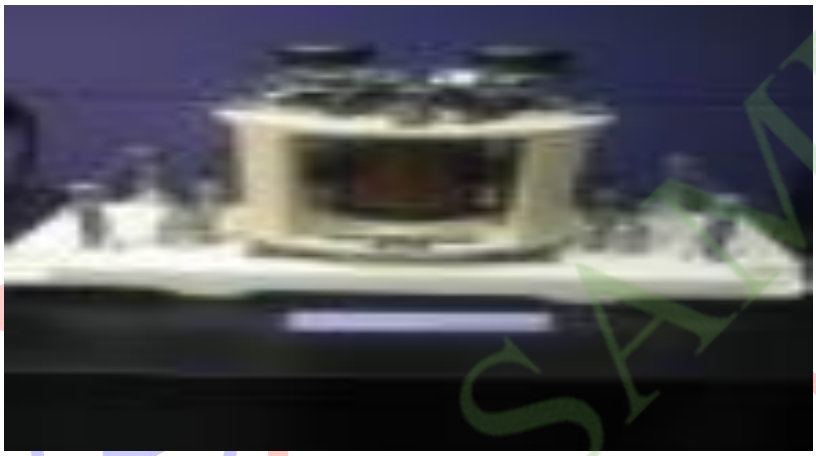




E. CPU (central processing unit) – *It is often referred to as the brain or engine of a computer where most of the processing and operations take place (CPU is part of a microprocessor).*



F. **Magnetic drum** – A cylinder coated with magnetic material, on which data and programs can be stored.



G. **Magnetic core** – uses arrays of small rings of magnetized material called cores to store information.

Classification of generations of computers –

The evolution of computer technology is often divided into five generations.

The main characteristics of first generation of computers (1940s-1950s)

I. Main electronic component – vacuum tube
II. Main memory – magnetic drums and magnetic tapes
III. Programming language – machine language
IV. Power – consume a lot of electricity and generate a lot of heat.
V. Speed and size – very slow and very large in size (often taking up entire room).
VI. Input/output devices – punched cards and paper tape.
VII. Examples – ENIAC, UNIVACI, IBM 650, IBM 701, etc.
VIII. Quantity – there were about 100 different vacuum tube computers produced between 1942 and1963.

Second Generation of Computers –

I. The main characteristics of second generation of computers (1950s-1960s)
II. Main electronic component – transistor
III. Memory – magnetic core and magnetic tape / disk
IV. Programming language – assembly language
V. Power and size – low power consumption, generated less heat, and smaller in size (in comparison with the first generation computers).
VI. Speed – improvement of speed and reliability (in comparison with the first generation computers).
VII. Input/output devices – punched cards and magnetic tape.
VIII. Examples – IBM 1401, IBM 7090 and 7094, UNIVAC 1107, etc.

Third Generation of Computers

The main characteristics of third generation of computers (1960s-1970s)

I. Main electronic component – integrated circuits (ICs)
II. Memory – large magnetic core, magnetic tape / disk
III. Programming language – high level language (FORTRAN, BASIC, Pascal, COBOL, C, etc.)
IV. Size – smaller, cheaper, and more efficient than second generation computers (they were called minicomputers).

Speed – improvement of speed .....

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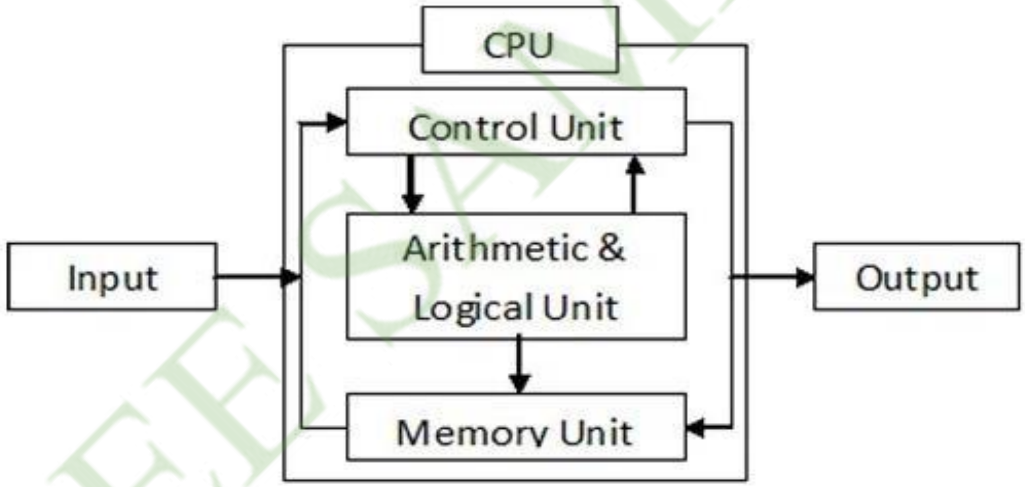
संपर्क करें – 8233195718, 9694804063, 8504091672

- **Input output devices (I/O)-**

Components of a computer system-

There are Mainly Five basic Components of a computer system.

1. Input Unit
2. Output unit
3. Memory Unit
4. Control unit
5. Arithmetic and Logic Unit



Input Devices -

Input devices are used to provide data and control signals to a computer. Input devices allow us to enter raw data in computer for processing.

Types of Input Devices-

1. Mouse-

a. A computer mouse is a handheld hardware input device that controls a cursor in a GUI (graphical user interface) and can move and select text, icons, files, and folders on your computer.

b. The mouse was initially known as the X-Y Position Indicator for a Display System and was invented by Douglas Engel Bart in 1963 while working at Xerox PARC.

Uses of a mouse-

a) **Move the mouse cursor** - The primary function is to move the mouse pointer on the screen.

b) **Point** - Once the mouse is moved, you can point something out for another user or point a digital object. For example, in a game you can use the mouse to point a gun in the direction to shoot.

c) **Open or execute a program** - Once you've moved the pointer to an icon, folder, or another object clicking or double-clicking that object opens the document or executes the program.

d) **Select** - A mouse also allows you to select text or a file or highlight and select multiple files at once.

e) **Drag-and-drop** – Once something is selected, it can also be moved using the drag-and-drop method.

f) **Hover** – Moving the mouse cursor over objects with hover information helps discover each object's function.

g) **Scroll** –

I. When working with a long document or viewing a long web page, you may need to scroll up or down.

II. To scroll, rotate the mouse wheel, or click-and-drag the scroll bar.

III. The mouse wheel can also be used as a button.

Parts of a computer mouse-

The parts of a computer mouse can vary by the type of computer mouse. Some parts are-

a) Buttons-

Today, almost all computer mice have at least two buttons, a left button and right button for clicking and manipulating objects and text.

b) Ball, laser, or LED-

I. Bottom of optical-mechanical and optical computer mouse

II. A desktop mouse uses a ball and rollers if it's a mechanical mouse or a laser or LED if it's an optical mouse.

III. These components track the movement of the mouse on an x-axis and y-axis and move the mouse cursor on the screen.

c) Mouse wheel

Today's desktop computer mice also usually include a mouse wheel that allows you to scroll up and down on a page.

Computer mouse ports-

Today, most computer mice connect to a computer using a USB port. Below is a list of ports and wireless connections a mouse is capable of using.

I. Bluetooth
II. Infrared
III. PS/2 Port
IV. Serial Port
V. USB

Types of Mouse -

Wired Mouse-

I. A wired mouse connects directly to your desktop or laptop, usually through a USB port, and transmits information via the cord.
II. The cord connection provides several key advantages.
III. For starters, wired mice provide fast response time, as the data is transmitted directly through the cable.

IV. They also tend to be more accurate than other designs. This can make wired models great for gamers, digital artists, and other users who rely on high accuracy.

Wireless Mouse-

I. Wireless mice transmit radio signals to a receiver connected to your computer.
II. The computer accepts the signal and decodes how the cursor was moved or what buttons were clicked.
III. While the freedom or range with wireless models is convenient, there are some drawbacks.
IV. The decoding process, for instance, means that a wireless mouse is generally not as responsive to gestures as a wired mouse.
V. Gamers in particular might find the lag frustrating.
VI. That said, there are specific wireless mice designed for gaming that address the latency issue in their design and have quicker response times.
VII. For most users, however, the lag or lost accuracy with a wireless model will be negligible.

Bluetooth Mouse-

I. Wireless mouse designs and Bluetooth mouse designs tend to look very similar, as neither needs a wired connection to operate.

II. Most wireless mice models use a dongle that connects to your PC, and the mouse communicates back and forth in that manner.

III. A Bluetooth mouse, however, utilizes an internal Bluetooth connection on your PC, allowing you to connect the mouse to multiple devices at a time.

IV. Keep in mind, however, that not all devices have Bluetooth connections.

V. If your computer does not have an internal Bluetooth receiver, you can get USB receiver that can be plugged into your computer to use with your Bluetooth mouse and other Bluetooth devices.

	Wired Mouse	**Wireless Mouse**	**Bluetooth Mouse**
Advantages	I. Better accuracy II. Low-latency II. More affordable V. No batteries required	I. Extended range from computer. II. Not restrained by cord length Unrestricted movement. III. Doesn't require mouse pad	I. Extended range from computer II. Not restrained by cord length III. Unrestricted movement IV. Doesn't require mouse pad

Disadvantages	I. Less freedom of movement II. Constrained to length of cord II. Less convenient	I. Requires batteries to operate II. Lower accuracy (may be negligible for non-gamer users) III. More expensive than wired models	I. Requires batteries to operate I. Lower accuracy (may be negligible for non-gamer users) II. More expensive than wired models V. May require purchase of USB Bluetooth receiver if your machine does not have Bluetooth functionality

2. Trackball-

I. A trackball is a computer cursor control device used in many notebook and laptop computers.

II. The trackball is usually located in front of the keyboard toward the user.

III. Essentially, the trackball is an upside-down mouse that rotates in place within a socket.

IV. The user rolls the ball to direct the cursor to the desired place on the screen and can click one of two buttons (identical to mouse buttons) near the trackball to select desktop objects or position the cursor for text entry.

V. There are usually one or two buttons provided with a trackball that have the same capability as click buttons on a mouse.

VI. Unlike other input devices which need movement like the mouse, a trackball is stationary and does not require much space.

VII. It can also work on most surfaces which is a great advantage compared to other input devices.

Advantages of using a trackball -:

a) Less work surface is required for trackball to function.

b) As it's stationary, the trackball allows continuous and fast scrolling and does not require repositioning.

c) Precision control is more the case of the trackball. Ergonomic advantages are more pronounced trackballs.

d) Unlike other input devices, trackballs require only minimal cleaning

Disadvantages of using a trackball -:

a) Compared to mouse, trackballs are physically larger.

b) As they are little more expensive, the selection is not as broad as other input devices.

3. Keyboard

a. A keyboard is for putting information including letters, words and numbers into your computer.

b. You press the individual buttons on the keyboard when you type.

c. The number keys across the top of the keyboard are also found on the right of the keyboard.

d. The letter keys are in the centre of the keyboard.

e. The symbol keys to the right of the letters include symbols such as the question mark and full stop.

f. The keys that surround the letters, numbers and symbol keys on the left, right and bottom of the keyboard help you to choose where and how you type.

Using the keys-

a) When you open a document or click in a box to type, you will see a vertical flashing line. This is called cursor, it shows you where you are about to start typing on a page or screen.

b) Pressing the 'shift' key allows you to type capital letters and the symbols at the top of the keys.

c) The 'shift' keys are on the left and right of the keyboard, with the arrow pointing upwards.

d) For capital letters, hold down the 'shift' key and hold and type the letter.

e) For symbols at the top of a number key, press down the symbol key and then type the symbol. You can use the 'shift' key to type any symbol at the top of a key.

f) The 'caps lock' key allows you to write in capital letters. To turn it on, press it once and type. To turn it off, press it again.

Putting in spaces, moving your cursor and deleting text-

a) The 'space bar' puts a space between words. Press it once to put in a space.

b) The 'tab' key puts a bigger space between words. Press it once to put in a space.

c) The 'enter' key moves your cursor down a line.

d) The 'arrow' keys allow you to move your cursor in all directions on the page or screen - up, down, left and right.

e) To delete your typing you need to put your cursor to the right of a word. Press the 'backspace' button to delete your word. The cursor will move to the left and delete as it goes.

Type of Keyboard-

- Qwerty Keyboards
- Wired Keyboards
- Ergonomic Keyboards
- Wireless Keyboards
- USB Keyboards
- Bluetooth Keyboards

Function of Keys of Keyboard

A. Alphabet Keys (A to Z)-

A keyboard has 26 .....

नोट – *प्रिय पाठकों , यह अध्याय अभी यहीं समाप्त नही हुआ है यह एक सैंपल मात्र है / इसमें अभी और भी काफी कंटेंट पढ़ना बाकी है जो आपको* ***राजस्थान कंप्यूटर अनुदेशक (शिक्षक)*** *के इन कम्पलीट नोट्स में पढ़ने को मिलेगा / यदि आपको हमारे नोट्स के सैंपल अच्छे लगे हों तो कम्पलीट नोट्स खरीदने के लिए हमारे संपर्क नंबर पर कॉल करें , हमें पूर्ण विश्वास है कि ये नोट्स आपकी* ***राजस्थान कंप्यूटर अनुदेशक (शिक्षक)*** *की परीक्षा में पूर्ण संभव मदद करेंगे , धन्यवाद /*

- ***Output devices-***

Output device receives information from the CPU and presents it to the user in the desired from.

I. *The processed data, stored in the memory of the computer is sent to the output unit, which then converts it into a form that can be understood by the user.*

II. *The output is usually produced in one of the two ways – on the display device, or on paper (hard copy).Output devices return processed data that is information, back to the user.*

III. *An output device is any piece of computer hardware equipment used to communicate the results of data processing carried out by an*

information processing system (such as a computer) which converts the electronically generated information into human-readable form.

IV. An output device is used to send data out of the system. The user sees the result after processing of data by the computer through output devices

Types of Output Devices –

These can be categorised into three types based on the output produced by the computer these are -

1. soft copy
2. hard copy
3. sound output

1. Soft copy output device

The output on the screen is called a soft copy. The soft copy output can be provided on the following devices.

Monitor (Visual display units (VDUs))

I. Visual display units (VDUs) are television-like screens that provide the user-interface in the form of display of text, numbers and images.

II. The VDUs may be monochrome or colour.

III. The support of monochrome or colour and clarity of display depend on the type of video monitor and the video adapter installed in the microcomputer.

IV. The video display terminal (VDT) consists of a monitor or CRT and a keyboard.

V. The CRT serves as an output device and the keyboard as an input device.

VI. Thus VDT is an input/output device.

VII. If the terminal is provided with some memory and certain processing capability, it becomes a smart or intelligent terminal.

VIII. A terminal without processing power is called a dumb terminal.

Types of Monitor –

A. Cathode-Ray Tube (CRT) Monitor

I. The CRT display is made up of pixels generated by phosphorescent dots.

II. The sharpness and clarity of the image depends upon the number and size of the pixels.

III. Cathode-ray tubes work like vacuum tubes which produce images in the form of video signals.

IV. The front surface of the screen is called face plate, which is made up of fiber optics and displays images.

V. There are three electron beams red, green and blue that beats the screen.

VI. So the colours which you see on the screen are the blends of these three beams.

VII. Early TVs are an example of CRT display. The disadvantage of CRT displays is that they were large in size and need high power.

A. Flat-Panel Display Monitor-

I. These days flat-panel display technology is consolidate.

II. They have reduced volume, weight and power requirement in comparison to the CRT. They use liquid crystals or plasma to produce output.

III. Light passes through the liquid crystals to generate pixels.

IV. Calculators, video games, monitors, laptops and graphics display, all are current uses of flat-panel displays that can be hanged on walls or wear on your wrists.

B. LCD Monitor (Liquid-Crystal Device)

1. The LCD Monitor is a flat panel screen that is smart in size and light weight.

It consists of liquid crystal technology which is used in .....

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- **Representation of data-**

1. Digital-

I. Personal computers are an example of a digital computer.

II. These computers accept input in the form of 0s and 1s.

III. The computer processes binary input and provides the output.

IV. These computers perform all the logical & arithmetical operations.

V. Any input given in any language is first converted into binary language and then the computer processes the information. Examples – laptops, PCs, mobile phones, desktops, etc.

2. Analog-

I. These computers process analog data. An analog data keep varying. Hence, it does not have any discrete value.

II. They read the continuous change in the input, process it, and then provide the output. Analog computers perform with equal diligence and accuracy.

III. They are however slower than digital computers.

IV. They are also slightly less precise.

V. Analog computers are for a Speedometer, thermometer, frequency, and signal of voltage, measuring the resistance of a capacitor.

3. Hybrid-

I. Hybrid computers are a mix of both analog and digital computers.

II. These computers perform a high level of calculations.

III. Hybrid computers are quick and efficient.

IV. They take input in analog form, convert it into digital form, and then process it to produce an output.

V. scientists are also using hybrid computers for complex calculations.

VI. For example, in the hospitals to measure the heartbeat of the patients, at research institutes to measure earthquakes and other natural calamities.

Number system (decimal , binary, and hexadecimal)-

Number system -

Number systems are the technique to represent numbers in the computer system architecture, every value that you are saving or getting into/from computer memory has a defined number system.

Computer architecture supports following number systems.

I. **Binary number system**

II. **Octal number system**

III. **Decimal number system**

IV. **Hexadecimal (hex) number system**

1) Binary Number System

A Binary number system has only two digits that are **0 and 1**.

Every number (value) represents with 0 and 1 in this number system.

The base of binary number system is 2, because it has only two digits.

2) Octal number system

Octal number system has only eight (8) digits from **0 to 7**.

Every number (value) represents with 0,1,2,3,4,5,6 and 7 in this number system.

The base of octal number system is 8, because it has only 8 digits.

3) Decimal number system

Decimal number system has only ten (10) digits from **0 to 9**.

Every number (value) represents with 0,1,2,3,4,5,6, 7,8 and 9 in this number system.

The base of .....

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कॉल करें , हमें पूर्ण विश्वास है कि ये नोट्स आपकी ***राजस्थान कंप्यूटर अनुदेशक (शिक्षक)*** *की परीक्षा में पूर्ण संभव मदद करेंगे , धन्यवाद ।*

संपर्क करें – 8233195718, 9694804063, 8504091672

Chapter – 2

Data Processing

Overview:-

Data processing occurs when data is collected and translated into usable information. Usually performed by a data scientist or team of data scientists, it is important for data processing to be done correctly as not to negatively affect the end product, or data output.

Data processing starts with data in its raw form and converts it into a more readable format (graphs, documents, etc.), giving it the form and context necessary to be interpreted by computers and utilized by employees throughout an organization.

Six stages of data processing:-

I. Data collection

Collecting data is the first step in data processing. Data is pulled from available sources, including data lakes and data warehouses. It is important that the data sources available are trustworthy and well-built so the data collected (and later used as information) is of the highest possible quality.

2. Data preparation

Once the data is collected, it then enters the data preparation stage. Data preparation, often referred to as "pre-processing" is the stage at which raw data is cleaned up and organized for the following stage of data processing. During preparation, raw data is diligently checked for any errors. The purpose of this step is to eliminate bad data (redundant, incomplete, or incorrect data) and begin to create high-quality data for the best business intelligence.

3. Data input

The clean data is then entered into its destination (perhaps a CRM like Salesforce or a data warehouse like Redshift), and translated into a language that it can understand. Data input is the first stage in which raw data begins to take the form of usable information.

4. Processing

During this stage, the data inputted to the computer in the previous stage is actually processed for interpretation. Processing is done using machine learning algorithms, though the process itself may vary slightly depending on the source of data being processed (data lakes, social networks, connected devices etc.) and its intended use (examining advertising patterns, medical diagnosis from connected devices, determining customer needs, etc.).

5. Data output/interpretation

The output/interpretation stage is the stage at which data is finally usable to non-data scientists. It is translated, readable, and often in the form of graphs, videos, images, plain text, etc.). Members of the company or institution can now begin to self-serve the data for their own data analytics projects.

6. Data storage

The final stage of data processing is storage. After all of the data is processed, it is then stored for future use. While some information may be put to use immediately, much of it will serve a purpose later on. Plus, properly stored data is a necessity for compliance with data protection legislation like GDPR. When data is properly stored, it can be quickly and easily accessed by members of the organization when needed.

Word processing (MS - word)-

MSWORD-

Home Tab

This tab gives you access to the most commonly used commands and is displayed by default when you open an instance of Word.

This tab is reasonably consistent across Excel, Word and PowerPoint.

Clipboard - You can quickly display the Clipboard task pane by clicking on the dialog launcher in the bottom right corner of this group.

Paste - Button with Drop-Down. The drop-down contains the commands: Paste, Paste Special and Paste as Hyperlink.

Cut - (Ctrl + X). Cuts the current selection to the clipboard.

Copy - (Ctrl + C). Copies the current selection to the clipboard.

Format Painter - (Ctrl + Shift + C). Copies the formatting from one place in a document and lets you apply it somewhere else. This works across multiple documents.

Font -_This group provides access to all the Character Formatting commands.

You can quickly display the "Font" dialog box, Font Tab, by clicking on the dialog box launcher in the bottom right corner of this group.

Font - (Ctrl + Shift + F). Provides a list of all the available fonts (based on your current printer selection).

Font Size - (Ctrl + Shift + P). Lets you adjust the character size (based on your current printer selection).

Grow Font - (Ctr + >). Increases the font size of the current selection to the next larger size in the Font Size box. This was called Increase Font in Word 2003.

Shrink Font - (Ctrl + <). Decreases the font size of the current selection to the next smaller size in the Font Size box. This was called Decrease Font in Word 2003.

Change Case – Drop-Down. Changes the selected text to either uppercase, lowercase or another type of capitalisation. The drop-down contains the commands: Sentence Case, Lowercase, Uppercase, Capitalize Each Word and Toggle Case.

Clear All Formatting – (Ctrl + Spacebar). Clears all the formatting from the current selection.

Bold - (Ctrl + B). Toggles bold on the current selection.

Italic – (Ctrl + I). Toggles italics on the current selection.

Underline – (Ctrl + U). Button with Drop-Down. The button toggles bold on the current selection. The drop-down contains the commands: Underline, Double Underline, Thick Underline, Dotted Underline, Dashed Underline.

Strikethrough - Draws a line through the middle of the selected text.

Subscript – (Ctrl + =). Converts the selection to small letters below the text baseline.

Superscript - (Ctrl + Shift + +). Converts the selection to small letters above the text baseline.

Text Effects and Typography -

Text Highlight Color - Button with Drop-Down. Shades the background behind the current selection.The drop-down contains the commands: No Color and Stop Highlighting. For more details please refer to the Characters > Text Highlight page.

Font Color - Button with Drop-Down. The button changes the colour of the font of the current selection. The drop-down contains the commands: Automatic, Theme Colors, Standard Colors and More Colors.

Paragraph- This group provides access to all the Paragraph Formatting commands.

You can quickly display the "Paragraph" dialog box, Indents and Spacing Tab, by clicking on the dialog box launcher in the bottom right corner of this group.

Bullets - Button with Drop-Down. The button toggles single level bullets from the selected paragraphs. The drop-down contains the commands: Recently Used Bullets, Bullet Library, Document Bullets, Change List Level and Define New Bullet. The Change List Level extension displays

levels 1 to 9. The Define New Bullet displays the "Define New Bullet" dialog box.

Numbering – Button with Drop-Down. The button toggles single level numbering from the selected paragraphs. The drop-down contains the commands: Recently Used Numbering, Change List Level, Define New Number Format and Set Numbering Value.

Multilevel List - Drop-Down. The drop-down contains the commands: Current List. List Library, Change List Level, Define New Multilevel List and Define New List Style. A multilevel list shows the list of items at different levels, rather than just at one level. This was previously accessible from the Outline Numbered tab on the Bullets & Numbering dialog box and has replaced Outline numbering. Please refer to the Bullets > Multilevel List for more details.

Decrease Indent - Decreases the indent by 1 or removes the indent completely.

Increase Indent – Increases the indent by 1.

Sort – Displays the "Sort Text" or "Sort" dialog boxes allowing you to sort paragraphs of text or text within tables. If your current selection is not in a table then the "Sort Text" dialog box is displayed. If the current

selection is in a Table then the "Sort" dialog box is displayed. This command was previously on the Table drop-down in 2003 but now appears both on the Home Tab and Table Tools - Layout contextual tab.

Show/Hide Paragraph Marks - (Ctrl + *). Toggles the display of paragraph marks and other hidden formatting.

Align Left - (Ctrl + L). Aligns text to the left.

Center - (Ctrl + E). Aligns text to the center.

Align Right - (Ctrl + R). Aligns text to the right.

Justify - (Ctrl + J). Aligns text to both left and right margins adding extra space between words where necessary.

Line Spacing - Drop-Down. The drop-down contains the commands: 1.0, 1.15, 1.5, 2.0, 2.5, 3.0, Line Spacing Options, Add Space Before Paragraph and Add Space After Paragraph. The Line Spacing Options command displays the "Paragraphs" dialog box (Indents and Spacing tab). The default line spacing is 1.15.

Shading - Button with Drop-Down. The button applies the selected shading to the current selection. The drop-down contains the commands: Theme Colors, Standard Colors, No Color and More Colors.

Border - Button with Drop-Down. The button applies the selected border to the current selection. The drop-down contains the commands: Bottom

Border, Top Border, Left Border, Right Border, No Border, All Borders, Outside Borders, Inside Borders, Inside Horizontal Border, Inside Vertical Border, Diagonal Down Border, Diagonal Up Border, Horizontal Line, Draw Table, View Gridlines and Borders and Shading.

Styles-

You can quickly toggle the display of the Styles Task Pane by clicking on the dialog box launcher in the bottom right corner of this group.

Quick Styles – Displays a gallery of available styles (with auto preview). Is the Heading 1 style different in 2007 and 2010 to 2003. Yes the Normal template and styles are very different.

Change Styles – Drop-Down. (Removed in 2013). Lets you quickly change the style set, colour/theme and font of a style. The drop-down contains the commands: Style Set, Colors, Fonts and Set as Default. The Style Set extension contains the commands: Default (Black and White), Distinctive, Elegant, Fancy, Formal, Manuscript, Modern, Simple, Traditional, Word 2003, Word 2007, Reset to Quick Styles from Template, Reset Document Quick Styles and Save as Quick Style Set. The height of this extension can be adjusted.

Editing -

Find - Button with Drop-Down. The button displays the "Find and Replace" dialog box and displays the Find tab. The drop-down contains the commands: Find and GoTo. The GoTo tab can also be displayed by clicking on the Page: 1 of 2 indicator on the status bar in the bottom left corner.

Replace - This displays the "Find and Replace" dialog box and displays the Replace tab.

Select - Drop-Down. The drop-down contains the commands: Select All, Select Objects and Select Text with similar Formatting. The Select Text will select text with similar formatting.

2. Insert Tab -

This tab contains all the commands for inserting items into your documents.

Pages

Cover Page - Drop-Down. The drop-down contains the commands: Built-in, Remove Current Cover Page and Save Selection to Cover Page Gallery. The list of built-in cover pages is Alphabet.....

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संपर्क करें – 8233195718, 9694804063, 8504091672

प्रिय दोस्तों, अब तक हमारे नोट्स में से अन्य परीक्षाओं में आये हुए प्रश्नों के परिणाम –

EXAM (परीक्षा)	DATE	हमारे नोट्स में से आये हुए प्रश्न	कट ऑफ
RAS PRE. 2021	27 अक्टूबर	74 (98 MARKS)	64 (84.9 M.)
राजस्थान S.I. 2021	13 सितम्बर	113 of 200	117
राजस्थान S.I. 2021	14 सितम्बर	119 of 200	117
राजस्थान S.I. 2021	15 सितम्बर	126 of 200	117

RAJASTHAN PATWARI 2021	23 अक्तूबर (1st शिफ्ट)	79 of 150	Not declared yet
RAJASTHAN PATWARI 2021	23 अक्तूबर (2nd शिफ्ट)	103 of 150	
RAJASTHAN PATWARI 2021	24 अक्तूबर (1st शिफ्ट)	95 of 150	
RAJASTHAN PATWARI 2021	24 अक्तूबर (2nd शिफ्ट)	91 of 150	
RAJASTHAN VDO 2021	27 दिसंबर (1st शिफ्ट)	59 of 100	
RAJASTHAN VDO 2021	27 दिसंबर (2nd शिफ्ट)	61 of 100	
RAJASTHAN VDO 2021	28 दिसंबर (1st शिफ्ट)	56 of 100	
RAJASTHAN VDO 2021	28 दिसंबर (2nd शिफ्ट)	57 of 100	
U.P. SI 2021	14 नवम्बर 2021 1st शिफ्ट	91 of 160	
U.P. SI 2021	21 नवम्बर 2021	89 of 160	

	Ist शिफ्ट		

अन्य परीक्षाओं में भी इसी तरह प्रश्न आये हैं Proof देखने के लिए हमारे youtube चैनल (Infusion Notes) पर इसकी वीडियो देखें या हमारे नंबरों पर कॉल करें।

- **Common Short Cut Keys**

I. Press Ctrl + B to toggle the Bold attribute
II. Press Ctrl + I to toggle the Italic attribute
III. Press Ctrl + U to toggle the Underline attribute
IV. Press Ctrl + Q to remove paragraph formatting
V. Press Ctrl + C to copy selected text to the clipboard
VI. Press Ctrl + X to cut selected text to the clipboard
VII. Press Ctrl + V to paste text from clipboard
VIII. Press Ctrl + Z to undo the last action
IX. Press Ctrl + Y to redo the last action
X. Press Ctrl + Shift + < to decrease font size one point
XI. Press Ctrl + Shift + > to increase font size one point

XII. Press Ctrl + Spacebar to remove character formatting

XIII. Press Ctrl + Shift + Spacebar to create a non-breaking space

XIV. Press Ctrl + Hyphen to create a non-breaking hyphen

XV. Press Ctrl + Home to go to the start of the document

XVI. Press Ctrl + End to go to the end of the document

Function key Shortcuts

XVII. Press FI to access online Help or the Office Assistant

XVIII. Press F2 to move text or graphics

XIX. Press F3 to insert an AutoText entry (after Word displays the entry)

XX. Press F4 to repeat the last action

XXI. Press F5 to choose the Go To command (Edit menu)

XXII. Press F6 to go to next pane or frame

Press F7 to launch the .....

नोट – प्रिय पाठकों , यह अध्याय अभी यहीं समाप्त नही हुआ है यह एक सैंपल मात्र है / इसमें अभी और भी काफी कंटेंट पढ़ना बाकी है जो आपको **राजस्थान कंप्यूटर अनुदेशक (शिक्षक)** के इन कम्पलीट नोट्स में पढ़ने को मिलेगा / यदि आपको हमारे नोट्स के सैंपल अच्छे लगे हों तो कम्पलीट नोट्स खरीदने के लिए हमारे संपर्क नंबर पर

कॉल करें , हमें पूर्ण विश्वास है कि ये नोट्स आपकी ***राजस्थान कंप्यूटर अनुदेशक (शिक्षक)*** *की परीक्षा में पूर्ण संभव मदद करेंगे , धन्यवाद /*

संपर्क करें – 8233195718, 9694804063, 8504091672

- **Components of Microsoft Excel**

The components of MS-Excel are as follows

(i) Title Bar- It shows the name of the application and name of the file. It consists of three buttons, i.e. minimize, maximize and close.

(ii) Ribbon -It consists of a panel of commands which are organised into a set of tabs.

(iii) Tabs- It contains the command such as Home, Insert, Page Layout, Formulas, Data, Review, View, etc as well as any additional command that you may need.

Some commands are as follows

(a) Clipboard -A clipboard group contains the Cut, Copy and paste commands.

(b) Alignment- It is used to change alignment of the text in the cells - vertical alignment, horizontal alignment, indentation, wrap the text, shrink it to fit within the cell and merge multiple cells.

(c) Table- It is used to define a range of cell as a table for easy filtering and sorting and create a pivote table or chart to arrange and summarise the data.

(d) Function Library- It contains a library of functions (e.g. mathematical, logical, trigonometric, etc), such as AND, IF, LOOKUP, AVG, DATE, etc.

(e) Macro-s It is used to define a sequence of actions to perform on a document or multiple documents that can be executed again and again.

(iv) Status Bar- It displays information about the currently active worksheet. It includes page number, view shortcuts, zoom slider, etc.

(v) Formula Bar- It is located beneath the Ribbon. It is used to enter and edit worksheet data.

It includes -

a) Name box displays the all reference or column and row location of the active cell.

(b) Functions are predefined formulas that perform calculations by using specific values, called arguments.

Predefined formulas in MS-Excel are called functions.

There are different types of functions -

Function name	Type and description
ABS function	**Math and trigonometry:** Returns the absolute value of a number
ACCRINT function	**Financial:** Returns the accrued interest for a security that pays periodic interest
ACCRINTM function	**Financial:** Returns the accrued interest for a security that pays interest at maturity
ACOS function	**Math and trigonometry:** Returns the arccosine of a number
ACOSH function	**Math and trigonometry:** Returns the inverse hyperbolic cosine of a number
ACOT function 2013	**Math and trigonometry:** Returns the arccotangent of a number
ACOTH function 2013	**Math and trigonometry:** Returns the hyperbolic arccotangent of a number
AGGREGATE function	**Math and trigonometry:** Returns an aggregate in a list or database
ADDRESS function	**Lookup and reference:** Returns a reference as text to a single cell in a worksheet

AMORDEGRC function	**Financial:** Returns the depreciation for each accounting period by using a depreciation coefficient
AMORLINC function	**Financial:** Returns the depreciation for each accounting period
AND function	**Logical:** Returns TRUE if all of its arguments are TRUE
ARABIC function 2013	**Math and trigonometry:** Converts a Roman number to Arabic, as a number
AREAS function	**Lookup and reference:** Returns the number of areas in a reference
ARRAYTOTEXT function Office 365	**Text:** Returns an array of text values from any specified range
ASC function	**Text:** Changes full-width (double-byte) English letters or katakana within a character string to half-width (single-byte) characters
ASIN function	**Math and trigonometry:** Returns the arcsine of a number

ASINH function	**Math and trigonometry:** Returns the inverse hyperbolic sine of a number
ATAN function	**Math and trigonometry:** Returns the arctangent of a number
ATAN2 function	**Math and trigonometry:** Returns the arctangent from x- and y-coordinates
ATANH function	**Math and trigonometry:** Returns the inverse hyperbolic tangent of a number
AVEDEV function	**Statistical:** Returns the average of the absolute deviations of data points from their mean
AVERAGE function	**Statistical:** Returns the average of its arguments
AVERAGEA function	**Statistical:** Returns the average of its arguments, including numbers, text, and logical values
AVERAGEIF function	**Statistical:** Returns the average (arithmetic mean) of all the cells in a range that meet a given criteria

AVERAGEIFS function	**Statistical:** Returns the average (arithmetic mean) of all cells that meet multiple criteria.
BAHTTEXT function	**Text:** Converts a number to text, using the ß (baht) currency format
BASE function	**Math and trigonometry:** Converts a number into a text representation with the given radix (base)
BESSELI function	**Engineering:** Returns the modified Bessel function In(x)
BESSELJ function	**Engineering:** Returns the Bessel function Jn(x)
BESSELK function	**Engineering:** Returns the modified Bessel function Kn(x)
BESSELY function	**Engineering:** Returns the Bessel function Yn(x)
BETADIST function	**Compatibility:** Returns the beta cumulative distribution function In Excel 2007, this is a **Statistical** function.
BETA.DIST function 2010	**Statistical:** Returns the beta cumulative distribution function

BETAINV function	**Compatibility:** Returns the inverse of the cumulative distribution function for a specified beta distribution In Excel 2007, this is a **Statistical** function.
BETA.INV function 2010	**Statistical:** Returns the inverse of the cumulative distribution function for a specified beta distribution
BIN2DEC function	**Engineering:** Converts a binary number to decimal
BIN2HEX function	**Engineering:** Converts a binary number to hexadecimal
BIN2OCT function	**Engineering:** Converts a binary number to octal
BINOMDIST function	**Compatibility:** Returns the individual term binomial distribution probability In Excel 2007, this is a **Statistical** function.
BINOM.DIST function 2010	**Statistical:** Returns the individual term binomial distribution probability

BINOM.DIST.RANGE function 2013	**Statistical:** Returns the probability of a trial result using a binomial distribution
BINOM.INV function 2010	**Statistical:** Returns the smallest value for which the cumulative binomial distribution is less than or equal to a criterion value
BITAND function 2013	**Engineering:** Returns a 'Bitwise And' of two numbers
BITLSHIFT function 2013	**Engineering:** Returns a value number shifted left by shift_amount bits
BITOR function 2013	**Engineering:** Returns a bitwise OR of 2 numbers
BITRSHIFT function 2013	**Engineering:** Returns a value number shifted right by shift_amount bits
BITXOR function 2013	**Engineering:** Returns a bitwise 'Exclusive Or' of two numbers
CALL function	**Add-in and Automation:** Calls a procedure in a dynamic link library or code resource

CEILING function	**Compatibility:** Rounds a number to the nearest integer or to the nearest multiple of significance
CEILING.MATH function 2013	**Math and trigonometry:** Rounds a number up, to the nearest integer or to the nearest multiple of significance
CEILING.PRECISE function	**Math and trigonometry:** Rounds a number the nearest integer or to the nearest multiple of significance. Regardless of the sign of the number, the number is rounded up.
CELL function	**Information:** Returns information about the formatting, location, or contents of a cell This function is not available in Excel for the web.
CHAR function	**Text:** Returns the character specified by the code number
CHIDIST function	**Compatibility:** Returns the one-tailed probability of the chi-squared distribution **Note:** In Excel 2007, this is a **Statistical** function.

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- ***Excel short cut keys –***

1. Ctrl + N: To create a new workbook.
2. Ctrl + O: To open a saved workbook.
3. Ctrl + S: To save a workbook.
4. Ctrl + A: To select all the contents in a workbook.
5. Ctrl + B: To turn highlighted cells bold.
6. Ctrl + C: To copy cells that are highlighted.

7. Ctrl + D: To fill the selected cell with the content of the cell right above.

8. Ctrl + F: To search for anything in a workbook.

9. Ctrl + G: To jump to a certain area with a single command.

10. Ctrl + H: To find and replace cell contents.

11. Ctrl + I: To italicise cell contents.

12. Ctrl + K: To insert a hyperlink in a cell.

13. Ctrl + L: To open the create table dialog box.

14. Ctrl + P: To print a workbook.

15. Ctrl + R: To fill the selected cell with the content of the cell on the left.

16. Ctrl + U: To underline highlighted cells.

17. Ctrl + V: To paste anything that was copied.

18. Ctrl + W: To close your current workbook.

19. Ctrl + Z: To undo the last action.

20. Ctrl + 1: To format the cell contents.

21. Ctrl + 5: To put a strikethrough in a cell.

22. Ctrl + 8: To show the outline symbols.

23. Ctrl + 9: To hide a row.

24. Ctrl + 0: To hide a column.

25. Ctrl + Shift + :: To enter the current time in a cell.

26. Ctrl + ;: To enter the current date in a cell.

27. Ctrl + `: To change the view from displaying cell values to formulas.

28. Ctrl + ‘: To copy the formula from the cell above.

29. Ctrl + -: To delete columns or rows.

30. Ctrl + Shift + =: To insert columns and rows.

31. Ctrl + Shift + ~: To switch between displaying Excel formulas or their values in cell.

32. Ctrl + Shift + @: To apply time formatting.

33. Ctrl + Shift + !: To apply comma formatting.

34. Ctrl + Shift + $: To apply currency formatting.

35. Ctrl + Shift + #: To apply date formatting.

36. Ctrl + Shift + %: To apply .....

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संपर्क करें – 8233195718, 9694804063, 8504091672

Microsoft Access –

Microsoft Access

I. A database is a collection of logically related and similar data. Database stores similar kind of data for a specific purpose that is organised in such a manner that any information can be derived from it, when needed.

II. Microsoft Access is an application which allows the creating of databases. Microsoft Access is a Relational Database anagement System (RDBMS).

III. Access is a tool for managing the database.

IV. It allows you to design and create complete databases with quick and easy data entry, maintain them and search for information.

Elements of MS-Access

In MS-Access, database holds five major elements for every database operation

(i) Field Name It is a label provided for a field that specifies the type of information contained in a particular field.

(ii) Field Type/Data Type It specifies the type of data stored in the field such as textual data and numerical data or combination of both. The default size of data type is 50 in MS-Access.

(iii) Field Length Field refers length or width to the maximum number of characters that a field can contain.

(iv) Primary Key A field which is used to uniquely identify the records in a table. The primary key cannot contain null value.

(v) Validation Rule It is a condition that must be met before data is accepted into database.

(vi) MS-Access View You can create a table by two most popular ways

(a) Datasheet View It shows the data in the database and also allows you to enter and edit the data but not allow to change the database.

(b) Design View It allows you to create or change the table and also set the keys.

(vii) Filtering Data It enables to display only those records in a table that meet a specified filter criterion.

(viii) Relationship It is an association between access tables or queries that use related fields. It is a link between tables and enables us to accessed data from both tables simultaneously.

Relationship can be divided in three categories as One-to-One, One-to-Many and Many-to-Many

(ix) Attributes These can be defined as the characteristics of an entity to identify it uniquely. Such as student's attributes are his Roll-No, Section, Name, etc.

There are various types of queries for different uses:

I. **Select queries-** used for extracting specific information from a large multi-information
II. **Table-** They can also be helpful in merging related information from different tables.
III. **Make-Table queries-** used for making sub tables from the main table(s) and queries.
IV. **Update queries-** important in adding information in the fields of a Table.
V. **Append queries-** used to copy records from one table/ query to another.

VI. **Delete query-** to PERMANENTLY remove unwanted content from the table. NOTE:

VII. **Delete** - query should not be used unless one surely will not require the information to be deleted.

Reports

Reports provide a means of organizing and summarizing data. Reports are .....

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Chapter – 3

DSA (Data Structure And Algorithms)

INTRODUCTION TO ALGORITHMS AND DATA STRUCTURES

Definition: – An algorithm is a *Step By Step* process to solve a problem, where each step indicates an intermediate task. Algorithm contains finite number of steps that leads to the solution of the problem.

Properties /Characteristics of an Algorithm:- Algorithm has the following basic properties

Input-Output:- Algorithm takes '0' or more input and produces the required output. This is the basic characteristic of an algorithm.

Finiteness:- An algorithm must terminate in countable number of steps.

Definiteness:- Each step of an algorithm must be stated clearly and unambiguously.

Effectiveness: Each and every step in an algorithm can be converted in to programming language statement.

Generality: Algorithm is generalized one. It works on all set of inputs and provides the required output. In other words it is not restricted to a single input value.

Categories of Algorithm:

Based on the different types of steps in an Algorithm, it can be divided into three categories, namely.

Sequence

Selection and

Iteration

Sequence:- The steps described in an algorithm are performed successively one by one without skipping any step. The sequence of steps defined in an algorithm should be simple and easy to understand. Each instruction of such an algorithm is executed, because no selection procedure or conditional branching exists in a sequence algorithm.

Example:

// adding two numbers Step 1: start

Step 2: read a,b Step 3: Sum=a+b Step 4: write Sum Step 5: stop

Selection: The sequence type of algorithms are not sufficient to solve the problems, which involves decision and conditions. In order to solve

the problem which involve decision making or option selection, we go for Selection type of algorithm. The general format of Selection type of statement is as shown below:

if(condition) Statement-1;

else

Statement-2;

The above syntax specifies that if the condition is true, statement-1 will be executed otherwise statement-2 will be executed. In case the operation is unsuccessful. Then sequence of algorithm should be changed/ corrected in such a way that the system will re- execute until the operation is successful.

Example1:

```
// Person eligibility for vote
Step 1 : start
Step 2 : read age
Step 3 :  if age > = 18 then step_4 else step_5
Step 4 : write "person is eligible for vote"
Step 5 : write " person is not eligible for vote"
Step 6 : stop
```

Example2:

```
// biggest among two numbers
Step 1 : start
Step 2 : read a,b
Step 3 :  if a > b then
Step 4 : write "a is greater than b"
Step 5 : else
Step 6 : write "b is greater than a"
Step 7 : stop
```

Iteration: Iteration type algorithms are used in solving the problems which involves repetition of statement. In this type of algorithms, a particular number of statements are repeated 'n' no. of times.

Example:

Step 1 : start Step 2 : read n

Step 3 : repeat step 4 until n>0 Step 4 : (a) r=n mod 10

s=s+r

n=n/10 Step 5 : write s

Step 6 : stop

Performance Analysis an Algorithm:

The Efficiency of an Algorithm can be measured by the following metrics.

Time Complexityand

Space Complexity. i.Time Complexity:

The amount of time required for an algorithm to complete its execution is its time complexity. An algorithm is said to be efficient if it takes the minimum (reasonable) amount of time to complete its execution.

Space Complexity:

The amount of space occupied by an algorithm is known as Space Complexity. An algorithm is said to be efficient if it occupies less space and required the minimum amount of time to complete its execution.

Write an algorithm for roots of a Quadratic Equation?

// Roots of a quadratic Equation Step 1 : start

Step 2 : read a,b,c

Step 3 : if (a= 0) then step 4 else step 5

Step 4 : Write " Given equation is a linear equation " Step 5 : d=(b * b) _ (4 *a *c)

Step 6 : if (d>0) then step 7 else step8

Step 7 : Write " Roots are real and Distinct" Step 8: if(d=0) then step 9 else step 10

Step 9: Write "Roots are real and equal" Step 10: Write " Roots are Imaginary" Step 11: stop

Write an algorithm to find the largest among three different numbers entered by user

Step 1: Start

Step 2: Declare variables a,b and c. Step 3: Read variables a,b and c.

Step 4: If a>b

If a>c

Display a is the largest number. Else

Display c is the largest number.

Else

If b>c

Display b is the largest number. Else

Display c is the greatest number.

Step 5: Stop

Write an algorithm to find the factorial of a number entered by user.

Step 1: Start

Step 2: Declare variables n,factorial and i.

Step 3: Initialize variables factorial←1

i←1

Step 4: Read value of n

Step 5: Repeat the steps until i=n 5.1: factorial←factorial*i

5.2: i←i+1

Step 6: Display factorial Step 7: Stop

Write an algorithm to find the Simple Interest for given Time and Rate of

.....

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- **STACK and it's operations**

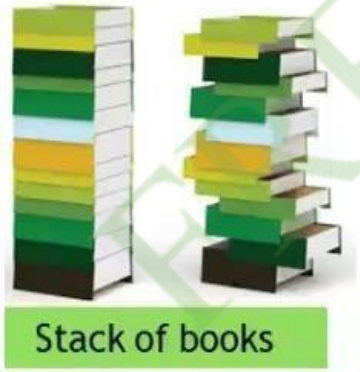
STACKS AND QUEUES

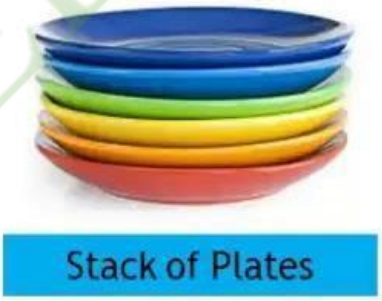
STACKS –

A Stack is linear data structure. A stack is a list of elements in which an element may be inserted or deleted only at one end, called the top of the stack. Stack principle is LIFO (last in, first out). Which element inserted last on to the stack that element deleted first from the stack.

As the items can be added or removed only from the top i.e. the last item to be added to a stack is the first item to be removed.

Real life examples of stacks are:


Stack of books


Stack of Plates


Stack of Toys

Operations on stack:

The two basic operations associated with stacks are:

Push

Pop

While performing push and pop operations the following test must be conducted on the stack.

Stack is empty or not b) stack is full or not

Push: Push operation is used to add new elements in to the stack. At the time of addition first check the stack is full or not. If the stack is full it generates an error message "stack overflow".

Pop: Pop operation is used to delete elements from the stack. At the time of deletion first check the stack is empty or not. If the stack is empty it generates an error message "stack underflow".

All insertions and deletions take place at the same end, so the last element added to the stack will be the first element removed from the stack. When a stack is created, the stack base remains fixed while the stack top changes as elements are added and removed. The most accessible element is the top and the least accessible element is the bottom of the stack.

Representation of Stack (or) Implementation of stack:

The stack should be represented in two ways:

Stack using array

Stack using linked list

1. Stack using array:

Let us consider a stack with 6 elements capacity. This is called as the size of the stack. The number of elements to be added should not exceed the maximum size of the stack. If we attempt to add new element beyond the maximum size, we will encounter a *stack overflow* condition. Similarly, you cannot remove elements beyond the base of the stack. If such is the case, we will reach a *stack underflow* condition.

push():When an element is added to a stack, the operation is performed by push(). Below Figure shows the creation of a stack and addition of elements using push().

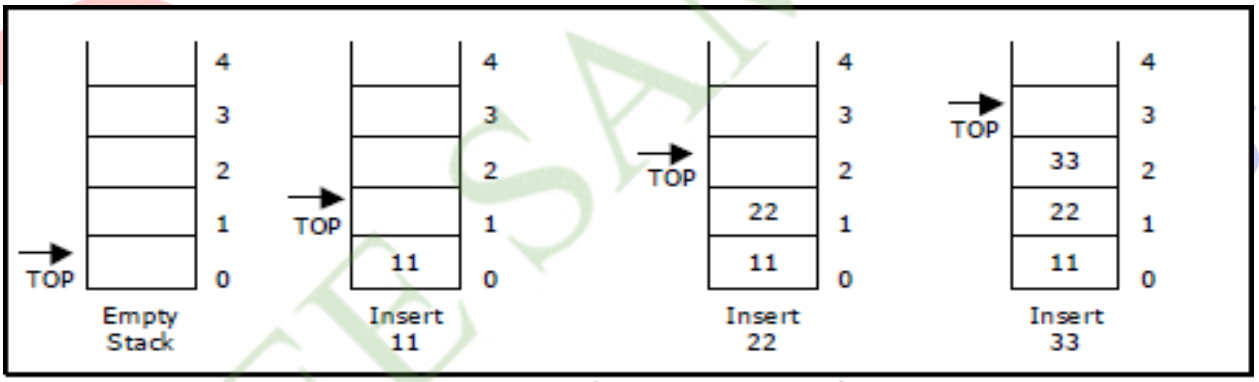


Figure . Push operations on stack

void push()
{
int x;
if(top >= n-1)
{
printf("\n\nStack Overflow..");
return;
	Algorithm: Procedure for push():
	
	Step 1: START
	Step 2: if top>=size-1 then
	Write " Stack is Overflow" Step 3: Otherwise

}
else
{
printf("\n\nEnter data: ");
scanf("%d", &x); stack[top] = x;
top = top + 1; printf("\n\nData Pushed into the stack");
}
}
	3.1: read data value 'x' 3.2: top=top+1;
	3.3: stack[top]=x;
	Step 4: END

Initially top=-1, we can insert an element in to the stack, increment the top value i.e top=top+1. We can insert an element in to the stack first check the condition is .....

नोट – प्रिय पाठकों , यह अध्याय अभी यहीं समाप्त नही हुआ है यह एक सैंपल मात्र है / इसमें अभी और भी काफी कंटेंट पढ़ना बाकी है जो आपको **राजस्थान कंप्यूटर अनुदेशक (शिक्षक)** के इन कम्पलीट नोट्स में पढ़ने को मिलेगा / यदि आपको हमारे नोट्स के सैंपल अच्छे लगे हों तो कम्पलीट नोट्स खरीदने के लिए हमारे संपर्क नंबर पर कॉल करें , हमें पूर्ण

विश्वास है कि ये नोट्स आपकी ***राजस्थान कंप्यूटर अनुदेशक (शिक्षक)*** *की परीक्षा में पूर्ण संभव मदद करेंगे , धन्यवाद /*

संपर्क करें – 8233195718, 9694804063, 8504091672

- **SORTING AND SEARCHING –**

Sorting is a technique of organizing the data. It is a process of arranging the records, either in ascending or descending order i.e. bringing some order lines in the data. Sort methods are very important in Data structures.

Sorting can be performed on any one or combination of one or more attributes present in each record. It is very easy and efficient to perform searching, if data is stored in sorting order. The sorting is performed according to the key value of each record. Depending up on the makeup of key, records can be stored either numerically or alphanumerically. In numerical sorting, the records arranged in ascending or descending order according to the numeric value of the key.

Let A be a list of n elements A1, A2, A3 An in memory. Sorting A refers to the

operation of rearranging the contents of A so that they are increasing in order, that is, so that A1 <=A2 <=A3 <=.....<=An. Since A has n elements, there are n! Ways that the contents can appear in A. these ways corresponding precisely to the n! Permutations of 1,2,3, n. accordingly each sorting algorithm must take care of these n! Possibilities.

Ex: suppose an array DATA contains 8elements as follows:

DATA: 70, 30,40,10,80,20,60,50.

After sorting DATA must appear in memory as follows:

DATA: 10 20 30 40 50 60 70 80

Since DATA consists of 8 elements, there are 8!=40320 ways that the numbers 10,20,30,40,50,60,70,80 can appear in DATA.

The factors to be considered while choosing sorting techniques are:

Programming Time

Execution Time

Number of Comparisons

Memory Utilization

Computational Complexity

Types of Sorting Techniques: -

Sorting techniques are categorized into 2 types. They are Internal Sorting and External Sorting.

Internal Sorting: Internal sorting method is used when small amount of data has to be sorted. In this method , the data to be sorted is stored in the main memory (RAM).Internal sorting method can access records randomly. EX: Bubble Sort, Insertion Sort, Selection Sort, Shell sort, Quick Sort, Radix Sort, Heap Sort etc.

External Sorting: Extern al sorting method is used when large amount of data has to be sorted. In this method, the data to be sorted is stored in the main memory as well as in the secondary memory such as disk.

External sorting methods an access records only in a sequential order. Ex: Merge Sort, Multi way Mage Sort.

Complexity of sorting Algorithms: The complexity of sorting algorithm measures the running time as a function of the number n of items to be stored. Each sorting algorithm S will be made up of the following operations, where A1, A2, A3 An contain the
items to be sorted and B is an auxiliary location.

Comparisons, which test whether Ai < Aj or test whether Ai <B.
Interchanges which switch the contents of Ai and Aj or of Ai and B.
Assignment which set B: Ai and then set Aj := B or Aj:= Ai
Normally, the complexity function measures only the number of comparisons, since the number of other operations is at most a constant factor of the number of comparisons.

SELECTION SORT -

In selection sort, the smallest value among the unsorted elements of the array is selected in every pass and inserted to its appropriate position into the array. First, find the smallest element of the array and place it on the first position. Then, find the second smallest element of the array and place it on the second position. The process continues until we get the sorted array. The array with n elements is sorted by using n-1 pass of selection sort algorithm.

In 1st pass, smallest element of the array is to be found along with its index pos. then, swap A[0] and A[pos]. Thus A[0] is sorted, we now have n -1 elements which are tobe sorted.

In 2nd pas, position pos of the smallest element present in the sub-array A[n- 1] is found. Then, swap, A[1] and A[pos]. Thus A[0] and A[1] are sorted, we now left with n-2 unsorted elements.

In n-1th pass, position pos of the smaller element between A[n-1] and A[n-2] is to be found. Then, swap, A[pos] and A[n-1].

Therefore, by following the above explained process, the elements A[0], A[1], A[2], ... , A[n-1] are sorted.

Example: Consider the following array with 6 elements. Sort the elements of the array by using selection sort.

A = {10, 2, 3, 90, 43, 56}.

Pass	Pos	A[0]	A[1]	A[2]	A[3]	A[4]	A[5]
1	1	2	10	3	90	43	56
2	2	2	3	10	90	43	56
3	3	2	3	10	90	43	56
4	4	2	3	10	43	90	56
5	5	2	3	10	43	56	90

Sorted A = {2, 3, 10, 43, 56, 90}

Complexity

Complexity	Best Case	Average Case	Worst Case
Time	$\Omega(n)$	$\theta(n^2)$	$o(n^2)$
Space			$o(1)$

Algorithm

SELECTION SORT (ARR, N) -

Step 1: Repeat Steps 2 and 3 for K = 1 to N-1 Step 2: CALL SMALLEST(A, K, N, POS)
Step 3: SWAP A[K] with A[POS] [END OF LOOP] Step 4: EXIT

BUBBLE SORT –

Bubble Sort: This sorting technique is also known as exchange sort, which arranges values by iterating over the list several times and in each iteration the larger value gets bubble up to the end of the list. This algorithm uses multiple passes and in each pass the first and second data items are compared. if the first data item is bigger than the second, then the two items are swapped. Next the items in second and third position are

compared and if the first one is larger than the second, then they are swapped, otherwise no change in their order. This process continues for each successive pair of data items until all items are sorted.

Bubble Sort Algorithm:

Step 1: Repeat Steps 2 and 3 for i=1 to 10 Step 2: Set j=1

Step 3: Repeat while j<=n

(A)

if a[i] < a[j] Then interchange a[i] and a[j] [End of if]

(B) Set j = j+1

[End of Inner Loop]

[End of Step 1 Outer Loop] Step 4: Exit

Various Passes of Bubble Sort

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- ***STACK APPLICATIONS***

INFIX INTO POSTFIX

EVALUATION OF THE POSTFIX EXPRESSION

Program:(a) *#include<stdio.h> #include<conio.h> #define MAX 50 char stack[MAX]; int top=-1*

void push(char); char pop(); int priority(char); void main()

```
{
char a[MAX],ch; int i; clrscr();
printf("Enter an infix expression:\t"); gets(a);
printf("\the postfix expression for the given expression is:\t");
for(i=0;a[i]!='\0';i++)
{
ch=a[i];
if((ch>='a') && (ch<='z')) printf("%c",ch);
else if(ch=='(') push(ch); else if(ch==')')
{
while((ch=pop())!='(') printf("%c",ch);
}
else
{
while(priority(stack[top])>priority(ch)) printf("%c",pop());
push(ch);
}
}
while(top>-1) printf("%c",pop()); printf("\n");
getch();
}
void push(char ch)
```

```
{
if(top==MAX-1)
{
printf("STACK OVERFLOW"); return;
}
else
{
top++;
stack[top]=ch;  }     } char pop()
{
int x; if(top==-1)
{
printf("STACK EMPTY");
}
else
{ x=stack[top]; top--; } return x;
}
int priority(char ch)

{
switch(ch)
{
```

```
case '^': return 4; case '*':
case '/': return 3; case '+':
case '-': return 2; default : return 0;
} }
```

OUTPUT:

```
Enter an infix expression:
((a + b ((b ^ c - d))) * (e - (a / c)))
The postfix expression for the given expression is: a b b c ^ d - + e a
c / - *
```

Program:(b)

```
#include<stdio.h> #include<conio.h> #include<math.h>
#include<ctype.h> void push(char); char pop(void);
char ex[50],s[50],op1,op2; int i,top=-1; void main()
{
clrscr();
printf("Enter the expression:"); gets(ex); for(i=0;ex[i]!='\0';i++)
{
if(isdigit(ex[i])) push(ex[i]-48); else
{
op2=pop(); op1=pop(); switch(ex[i])
{
case '+':push(op1+op2);
```

```
break;
case '-':push(op1-op2); break;
case '*':push(op1*op2); break;
case '/':push(op1/op2);
break; case '%':push(op1%op2);
break;
case '^':push(pow(op1,op2)); break;
}                    }    }
printf("result is :%d",s[top]); getch();
}
void push(char a)
{                    s[++top]=a; } char pop()
{ return(s[top--]);
}
```

OUTPUT:

```
Enter the expression: 384 * 2 / +83----
Result is: 14
```

4: TYPES OF QUEUES -

a).Priority queue b).Circular queue

Program: (a) #include<stdio.h> #include<conio.h> #include<malloc.h>

```
typedef struct node
{
int priority; int info;
struct node *link;
}n;
n *getnode()
{
return ( (n *)malloc(sizeof(n)));
}
n*front=NULL,*temp=NULL,*ptr=NULL,*q=NULL; void insertion();
void deletion(); void display(); void main()
{
int ch; clrscr();
printf("\tMenu\n1.Insertion\n2.Deletion\n3.Display\n4.exit");
while(1)
{
printf("Enter your choice"); scanf("%d",&ch); switch(ch)
{
case 1:insertion();
break; case 2:deletion();
break; case 3:display();
```

```
break; case 4:exit();
default : printf("\nInvalid choice "); break;
}                }    }
void insertion()
{ int item,item_prty; temp=getnode();
printf("Enter item to insert "); scanf("%d",&item); printf("Enter item
prority          ");

scanf("%d",&item_prty); temp->priority=item_prty; temp->info=item;
if(front==NULL||item_prty>front->priority)
{
temp->link=front; front=temp;
}
else
{
q=front;
while (q->link!=NULL &&q->link-> priority >=item_prty) q=q->link;
temp->link=q->link; q->link=temp;
}
}
void deletion()
{ if(front==NULL) printf("Queue is underflow"); else
```

{ .....

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संपर्क करें – 8233195718, 9694804063, 8504091672

Chapter – 4

Computer Organization and Operating System

Basic Structure of computer –

Computer types: –

A computer can be defined as a fast electronic calculating machine that accepts the (data) digitized input information process it as per the list of internally stored instructions and produces the resulting information. List of instructions are called programs & internal storage is called computer memory.

The different types of computers are –

1. **Personal computers: –** This is the most common type found in homes, schools, Business offices etc., It is the most common type of desk top computers with processing and storage units along with various input and output devices.
2. **Note book computers: –** These are compact and portable versions of PC
3. **Work stations: –** These have high resolution input/output (I/O) graphics capability, but with same dimensions as that of desktop

computer. These are used in engineering applications of interactive design work.

4. **Enterprise systems: -** These are used for business data processing in medium to large corporations that require much more computing power and storage capacity than work stations. Internet associated with servers have become a dominant worldwide source of all types of information.

5. **Super computers: -** These are used for large scale numerical calculations required in the applications like weather forecasting etc.,

Functional unit: -

A computer consists of five functionally independent main parts input, memory, arithmetic logic unit (ALU), output and control unit.

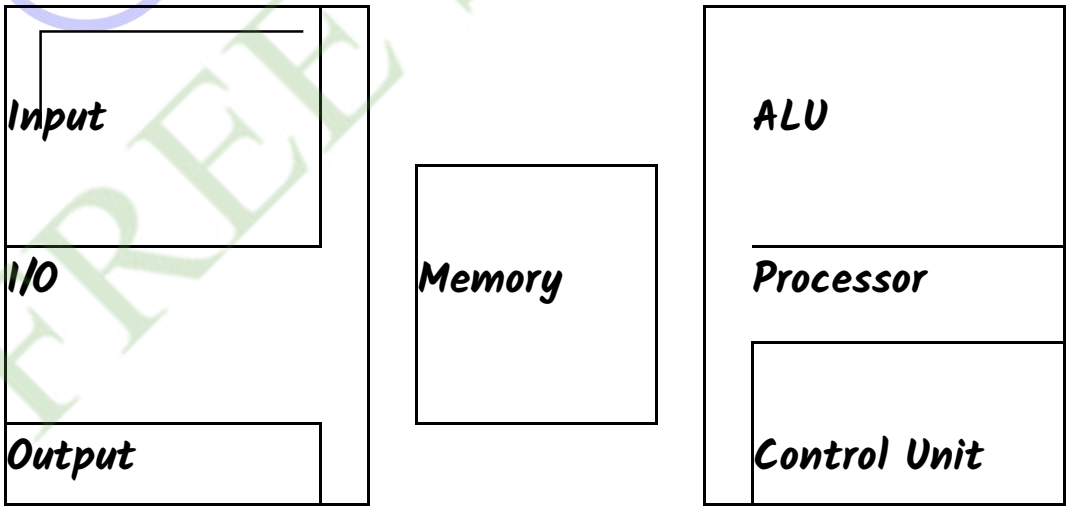

Fig a : Functional units of computer

Input device accepts the coded information as source program i.e. high level language. This is either stored in the memory or immediately used by the processor to perform the desired operations. The program stored in the memory determines the processing steps. Basically the computer converts one source program to an object program. i.e. into machine language.

Finally the results are sent to the outside world through output device. All of these actions are coordinated by the control unit.

Input unit: -

The source program/high level language program/coded information/simply data is fed to a computer through input devices keyboard is a most common type. Whenever a key is pressed, one corresponding word or number is translated into its equivalent binary code over a cable & fed either to memory or processor.

Joysticks, trackballs, mouse, scanners etc are other input devices.

Memory unit: -

Its function into store programs and data. It is basically to two types

1. ***Primary memory***
2. ***Secondary memory***

I. Primary memory: *– Is the one exclusively associated with the processor and operates at the electronics speeds programs must be stored in this memory while they are being executed. The memory contains a large number of semiconductors storage cells. Each capable of storing one bit of information. These are processed in a group of fixed site called word.*

To provide easy access to a word in memory, a distinct address is associated with each word location. ***Addresses are*** *numbers that identify memory location.*

Number of bits in each word is called word length of the computer. Programs must reside in the memory during execution. Instructions and data can be written into the memory or read out under the control of processor.

Memory in which any location can be reached in a short and fixed amount of time after specifying its address is called random-access memory (RAM).

The time required to access one word in called memory access time. Memory which is only readable by the user and contents of which can't

be altered is called read only memory (ROM) it contains operating system.

Caches are the small fast RAM units, which are coupled with the processor and are often contained on the same IC chip to achieve high performance. Although primary storage is essential it tends to be expensive.

2 Secondary memory: - Is used where large amounts of data & programs have to be stored, particularly information that is accessed infrequently.

Examples: - Magnetic disks & tapes, optical disks (ie CD-ROM's), floppies etc., ...

- **Arithmetic logic unit (ALU):-**

Most of the computer operators are executed in ALU of the processor like addition, subtraction, division, multiplication, etc. the operands are brought into the ALU from memory and stored in high speed storage elements called register. Then according to the instructions the operation is performed in the required sequence.

The control and the ALU are may times faster than other devices connected to a computer system. This enables a single processor to control a number of external devices such as key boards, displays, magnetic and optical disks, sensors and other mechanical controllers.

Output unit:-

These actually are the counterparts of input unit. Its basic function is to send the processed results to the outside world.

Examples:- *Printer, speakers, monitor etc.*

Control unit:-

It effectively is the nerve center that sends signals to other units and senses their states. The actual timing signals that govern the transfer of data between input unit, processor, memory and output unit are generated by the control unit.

Basic operational concepts: -

To perform a given task an appropriate program consisting of a list of instructions is stored in the memory. Individual instructions are brought from the memory into the processor, which executes the specified operations. Data to be stored are also stored in the memory.

Examples: - Add LOCA, R0

This instruction adds the operand at memory location LOCA, to operand in

register R0 & places the sum into register. This instruction requires the performance of several steps,

1. First the instruction is fetched from the memory into the processor.
2. The operand at LOCA is fetched and added to the contents of R0
3. Finally the resulting sum is stored in the register R0

The preceding add instruction combines a memory access operation with an ALU Operations. In some other type of computers, these two types of operations are performed by separate instructions for .....

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Floating-Point Arithmetic operations -

In many high-level programming languages we have a facility for specifying floating-point numbers. The most common way is by a real declaration statement. High level programming languages must have a provision for handling floating-point arithmetic operations. The operations are generally built in the internal hardware. If no hardware is available, the compiler must be designed with a package of floating-point software subroutine. Although the hardware method is more expensive, it is much more efficient than the software method. Therefore, floating- point hardware is included in most computers and is omitted only in very small ones.

Basic Considerations :

There are two part of a floating-point number in a computer - a mantissa m and an exponent e. The two parts represent a

number generated from multiplying m times a radix r raised to the value of e. Thus

$m \times r^e$

The mantissa may be a fraction or an integer. The position of the radix point and the value of the radix r are not included in the registers. For example, assume a fraction representation and a radix

10. The decimal number 537.25 is represented in a register with m = 53725 and e = 3 and is interpreted to represent the floating-point number

$.53725 \times 10^3$

A floating-point number is said to be normalized if the most significant digit of the mantissa in nonzero. So the mantissa contains the maximum possible number of significant digits. We cannot normalize a zero because it does not have a nonzero digit. It is represented in floating-point by all 0's in the mantissa and exponent.

Floating-point representation increases the range of numbers for a given register. Consider a computer with 48-bit words. Since one bit must be reserved for the sign, the range of fixed-point integer numbers will be $+ (2^{47} - 1)$, which is approximately $+ 10^{14}$. The 48 bits can be used to represent a floating-point number with 36 bits for the mantissa and 12 bits for the exponent. Assuming fraction representation for the mantissa and taking the two sign bits into consideration, the range of numbers that can be represented is

$+ (1 - 2^{-35}) \times 2^{2047}$

This number is derived from a fraction that contains 35 1's, an exponent of 11 bits (excluding its sign), and because $2^{11}-1 = 2047$. The largest number that can be accommodated is approximately 10^{615}. The mantissa that can accommodated is 35 bits (excluding the sign) and if considered as an integer it can store a number as large as $(2^{35} -1)$. This is approximately equal to 10^{10}, which is equivalent to a decimal number of 10 digits.

Computers with shorter word lengths use two or more words to represent a floating-point number. An 8-bit microcomputer uses four words to represent one floating-point number. One word of 8 bits are reserved for the exponent and the 24 bits of the other three words are used in the mantissa Arithmetic operations with floating-point numbers are more complicated than with fixed-point numbers. Their execution also takes longer time and requires more complex hardware. Adding or subtracting two numbers requires first an alignment of the radix point since the exponent parts must be made equal before adding or subtracting the mantissas. We do this alignment by shifting one mantissa while its exponent is adjusted until it becomes equal to the

other exponent. Consider the sum of the following floating-point numbers:

$.5372400 \times 10^{2}$

$+ .1580000 \times 10^{-1}$

Floating-point multiplication and division need not do an alignment of the mantissas. Multiplying the two mantissas and adding the exponents can form the product. Dividing the mantissas and subtracting the exponents perform division.

The operations done with the mantissas are the same as in fixed-point numbers, so the two can share the same registers and circuits. The operations performed with the exponents are compared and incremented (for aligning the mantissas), added and subtracted (for multiplication) and division), and decremented (to normalize the result). We can represent the exponent in any one of the three representations - signed-magnitude, signed 2's complement or signed 1's complement.

Biased exponents have the advantage that they contain only positive numbers. Now it becomes simpler to compare their relative magnitude without bothering about their signs. Another advantage is that the smallest possible biased exponent contains all zeros. The floating-point

representation of zero is then a zero mantissa and the smallest possible exponent.

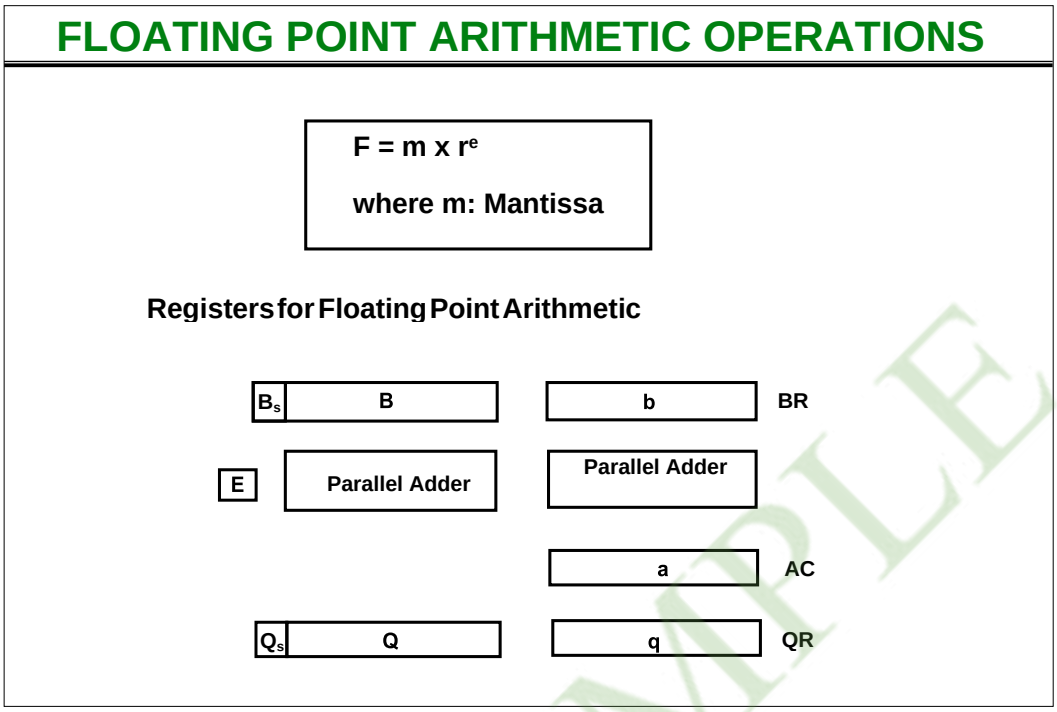
Register Configuration –

The register configuration for floating-point operations is shown in figure 4.13. As a rule, the same registers and adder used for fixed-point arithmetic are used for processing the mantissas. The difference lies in the way the exponents are handled.

The register organization for floating-point operations is shown in Fig. 4.13. Three registers are there, BR, AC, and QR. Each register is subdivided into two parts. The mantissa part has the same uppercase letter symbols as in fixed-point representation. The exponent part may use corresponding lower-case letter symbol.

Computer Arithmetic

14. Floating Point Arithmetic



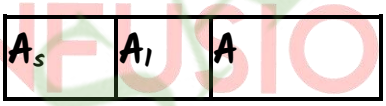


Figure 4.13: *Registers for Floating Point arithmetic operations*

Assuming that each floating-point number has a mantissa in signed-magnitude representation and a biased exponent. Thus the AC has a mantissa whose sign is in As, and a magnitude that is in A. The diagram shows the most significant bit of A, labeled by A1. The bit in his position must be a 1 to normalize the number. Note that the symbol AC represents the entire register, that is, the concatenation of As, A and a.

In the similar way, register BR is subdivided into Bs, B, and b and QR into Qs, Q and q. A parallel-adder adds the two mantissas and loads the sum into A and the carry into E. A separate parallel adder can be used for the exponents. The exponents do not have a district sign bit because they are biased but are represented as a biased positive quantity. It is assumed that the floating- point number are so large that the chance of an exponent overflow is very remote and so the exponent overflow will be neglected. The exponents are also connected to a magnitude comparator that provides three binary outputs to indicate their relative magnitude.

The number in the mantissa will be taken as a fraction, so they binary point is assumed to reside to the left of the magnitude part. Integer representation for floating point causes certain scaling problems during multiplication and division. To avoid these problems, we adopt a fraction representation.

The numbers in the registers should initially be normalized. After each arithmetic operation, the result will be normalized. Thus all floating-point operands are always normalized.

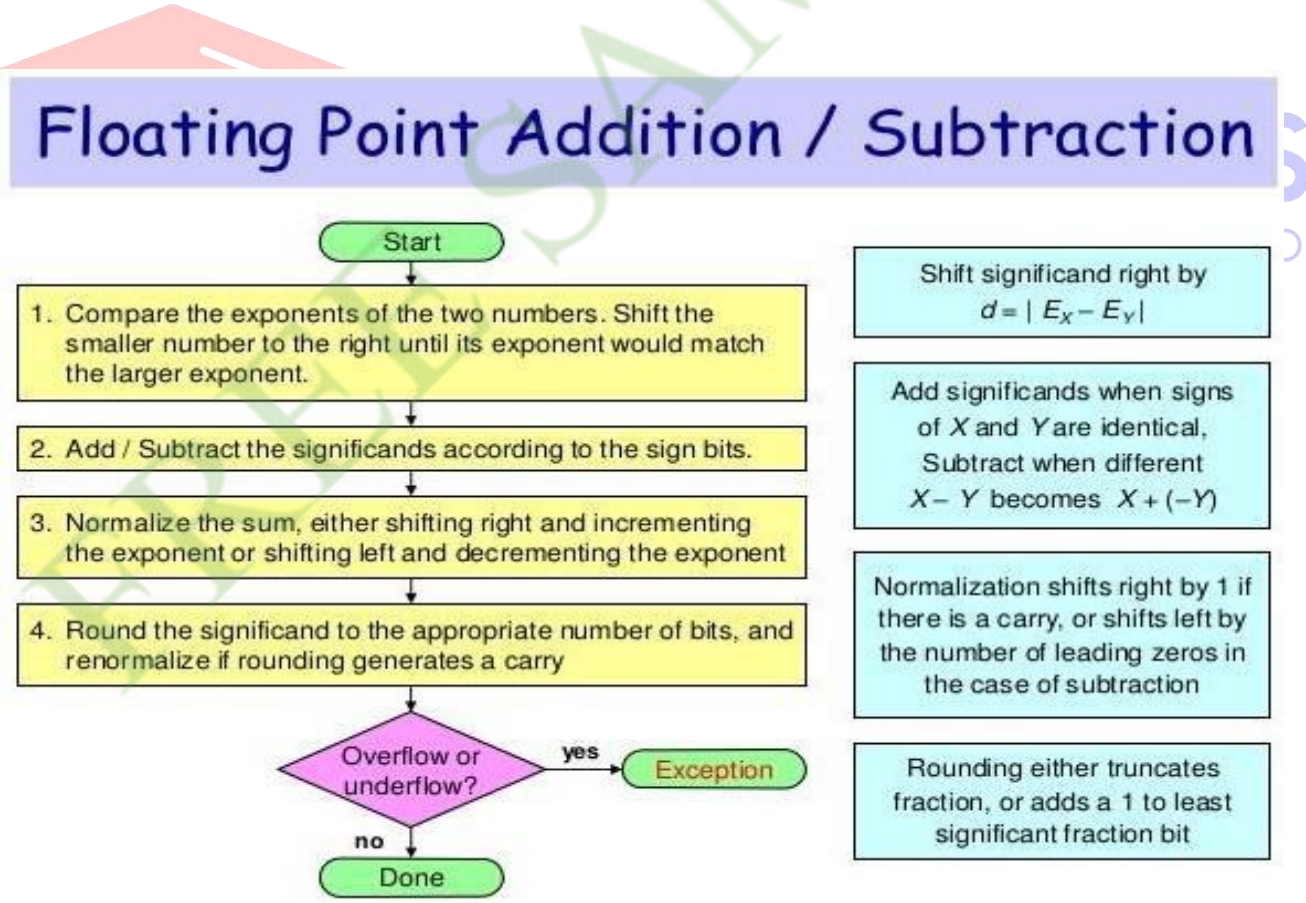
Addition and Subtraction of Floating Point Numbers

During addition or subtraction, the two floating-point operands are kept in AC and BR. The sum or difference is formed in the AC. The algorithm can be divided into four consecutive parts:

1. Check for zeros.
2. Align the mantissas.
3. Add or subtract the mantissas
4. Normalize the result

A floating-point number cannot be normalized, if it is 0. If this number is used for computation, the result may also be zero. Instead of checking for zeros during the normalization process we check for zeros at the beginning and terminate the process if necessary. The alignment of the mantissas must be carried out prior to their operation. After the mantissas are added or subtracted, the result may be un-normalized. The normalization procedure ensures that the result is normalized before it is transferred to memory.

If the magnitudes were subtracted, there may be zero or may have an underflow in the result. If the mantissa is equal to zero the entire floating-point number in the AC is cleared to zero. Otherwise, the mantissa must have at least one bit that is equal to 1. The mantissa has an underflow if the most significant bit in position A1, is 0. In that case, the mantissa is shifted left and the exponent decremented. The bit in A1 is checked again and the process is repeated until A1 = 1. When A1 = 1, the mantissa is normalized and the operation is completed.



.....

- ***Auxiliary Memory :***

Magnetic Tape: Magnetic tapes are used for large computers like mainframe computers where large volume of data is stored for a longer time. In PC also you can use tapes in the form of cassettes. The cost of storing data in tapes is inexpensive. Tapes consist of magnetic materials that store data permanently. It can be 12.5 mm to 25 mm wide plastic film-type and 500 meter to 1200 meter long which is coated with magnetic material. The deck is connected to the central processor and information is fed into or read from the tape through the processor. It's similar to cassette tape recorder Magnetic tape is an information storage medium consisting of a magnetisable coating on a thin plastic strip. Nearly all recording tape is of this type, whether used for video with a video cassette recorder, audio storage (reel-to-reel tape, compact audio cassette, digital audio tape (DAT), digital linear tape (DLT) and other formats including 8-track cartridges) or general purpose digital data storage using a computer (specialized tape formats, as well as the above- mentioned compact audio cassette, used with home computers of the 1980s, and DAT, used for backup in workstation installations of the 1990s).

- Magneto-optical and optical tape storage products have been

developed using many of the same concepts as magnetic storage, but have achieved little commercial success.

Magnetic Disk: You might have seen the gramophone record, which is circular like a disk and coated with magnetic material. Magnetic disks used in computer are made on the same principle. It rotates with very high speed inside the computer drive. Data is stored on both the surface of the disk. Magnetic disks are most popular for direct access storage device. Each disk consists of a number of invisible concentric circles called tracks. Information is recorded on tracks of a disk surface in the form of tiny magnetic spots. The presence of a magnetic spot represents one bit and its absence represents zero bit. The information stored in a disk can be read many times without affecting the stored data. So the reading operation is non-destructive. But if you want to write a new data, then the existing data is erased from the disk and new data is recorded. For Example-Floppy Disk.

The primary computer storage device. Like tape, it is magnetically recorded and can be re-recorded over and over. Disks are rotating platters with a mechanical arm that moves a read/write head between the outer and inner edges of the platter's surface. It can take as long as one second to find a location on a floppy disk to as little as a couple of milliseconds on a fast hard disk. See hard disk for more details.

The disk surface is divided into concentric tracks (circles within circles). The thinner the tracks, the more storage. The data bits are recorded as tiny magnetic spots on the tracks. The smaller the spot, the more bits per inch and the greater the storage.

Sectors

Tracks are further divided into sectors, which hold a block of data that is read or written at one time; for example, READ SECTOR 782, WRITE SECTOR 5448. In order to update the disk, one or more sectors are read into the computer, changed and written back to disk. The operating system figures out how to fit data into these fixed spaces. Modern disks have more sectors in the outer tracks than the inner ones because the outer radius of the platter is greater than the inner radius

word. The match register M has m bits, one for each memory word. Each word in memory is compared in parallel with the content of the argument register.

- The words that match the bits of the argument register set a corresponding bit in the match register.

- After the matching process, those bits in the match register that have been set indicate the fact that their corresponding words have been matched.

- Reading is accomplished by a sequential access to memory for those words whose corresponding bits in the match register have been set.

Hardware Organization

- The key register provides a mask for choosing a particular field or key in the argument word. The entire argument is compared with each memory word if the key register contains all 1's.

- **Optical Disk:** With every new application and software there is greater demand for memory capacity. It is the necessity to store large volume of data that has led to the development of optical disk storage medium. Optical disks can be divided into the following categories:

1. **Compact Disk/ Read Only Memory (CD-ROM**
2. **Write Once, Read Many (WORM)**
3. **Erasable Optical Disk**

Associative Memory :Content Addressable Memory (CAM).

- The time required to find an item stored in memory can be reduced considerably if stored data can be identified for access by .....

नोट – *प्रिय पाठकों , यह अध्याय अभी यहीं समाप्त नही हुआ है यह एक सैंपल मात्र है / इसमें अभी और भी काफी कंटेंट पढ़ना बाकी है जो आपको* ***राजस्थान कंप्यूटर अनुदेशक (शिक्षक)*** *के इन कम्पलीट नोट्स में पढ़ने को मिलेगा / यदि आपको हमारे नोट्स के सैंपल अच्छे लगे हों तो कम्पलीट नोट्स खरीदने के लिए हमारे संपर्क नंबर पर कॉल करें , हमें पूर्ण विश्वास है कि ये नोट्स आपकी* ***राजस्थान कंप्यूटर अनुदेशक (शिक्षक)*** *की परीक्षा में पूर्ण संभव मदद करेंगे , धन्यवाद /*

संपर्क करें – 8233195718, 9694804063, 8504091672

प्रिय दोस्तों, अब तक हमारे नोट्स में से अन्य परीक्षाओं में आये हुए प्रश्नों के परिणाम –

EXAM (परीक्षा)	DATE	हमारे नोट्स में से आये हुए प्रश्न	कट ऑफ
RAS PRE. 2021	27 अक्टूबर	74 (98 MARKS)	64 (84.9 M.)
राजस्थान S.I. 2021	13 सितम्बर	113 of 200	117
राजस्थान S.I. 2021	14 सितम्बर	119 of 200	117
राजस्थान S.I. 2021	15 सितम्बर	126 of 200	117
RAJASTHAN PATWARI 2021	23 अक्टूबर (1st शिफ्ट)	79 of 150	Not declared yet

RAJASTHAN PATWARI 2021	23 अक्तूबर (2nd शिफ्ट)	103 of 150	
RAJASTHAN PATWARI 2021	24 अक्तूबर (1st शिफ्ट)	95 of 150	
RAJASTHAN PATWARI 2021	24 अक्तूबर (2nd शिफ्ट)	91 of 150	
RAJASTHAN VDO 2021	27 दिसंबर (1st शिफ्ट)	59 of 100	
RAJASTHAN VDO 2021	27 दिसंबर (2nd शिफ्ट)	61 of 100	
RAJASTHAN VDO 2021	28 दिसंबर (1st शिफ्ट)	56 of 100	
RAJASTHAN VDO 2021	28 दिसंबर (2nd शिफ्ट)	57 of 100	
U.P. SI 2021	14 नवम्बर 2021 1st शिफ्ट	91 of 160	
U.P. SI 2021	21 नवम्बर 2021 1st शिफ्ट	89 of 160	

अन्य परीक्षाओं में भी इसी तरह प्रश्न आये हैं Proof देखने के लिए हमारे youtube चैनल (Infusion Notes) पर इसकी वीडियो देखें या हमारे नंबरों पर कॉल करें /

- **CPU And Instruction**

A BRIEF HISTORY OF COMPUERS: We begin our study of computers with a brief history.

First Generation: Vacuum Tubes

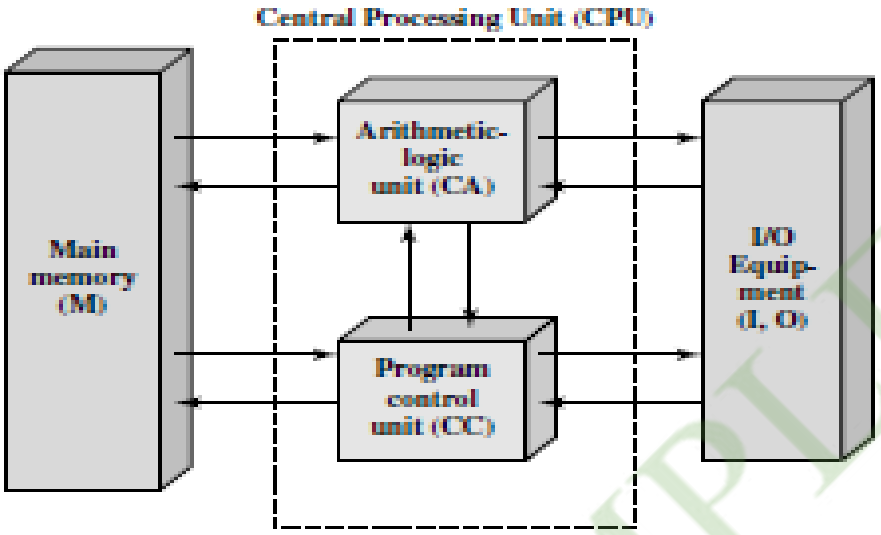
ENIAC The ENIAC (Electronic Numerical Integrator And Computer), designed and constructed at the University of Pennsylvania, was the world's first general-purpose electronic digital computer. The project was a response to U.S needs during World War II.

John Mauchly, a professor of electrical engineering at the University of Pennsylvania, and John Eckert, one of his graduate students, proposed to build a general-purpose computer using vacuum tubes for the BRL's application. In 1943, the Army accepted this proposal, and work began on the ENIAC. The resulting machine was enormous, weighing 30 tons, occupying 1500 square feet of floor space, and containing more than 18,000 vacuum tubes. When operating, it consumed 140 kilowatts of power. It was also substantially faster than any electromechanical computer, capable of 5000 additions per second.

The ENIAC was completed in 1946, too late to be used in the war effort. The use of the ENIAC for a purpose other than that for which it was built demonstrated its general-purpose nature. The ENIAC

continued to operate under BRL management until 1955, when it was disassembled.

THE VON NEUMANN MACHINE The task of entering and altering programs for the ENIAC was extremely tedious. The programming process can be easy if the program could be represented in a form suitable for storing in memory alongside the data. Then, a computer could get its instructions by reading them from memory, and a program could be set or altered by setting the values of a portion of memory. This idea is known as the stored-program concept. The first publication of the idea was in a 1945 proposal by von Neumann for a new computer, the EDVAC (Electronic Discrete Variable Computer). In 1946, von Neumann and his colleagues began the design of a new stored-program computer, referred to as the IAS computer, at the Princeton Institute for Advanced Studies



The IAS computer,although not completed until 1952,is the prototype of all subsequent general-purpose computers.

Figure 1.1 Structure of IAS ComputerFigure 1.1 shows the general structure of the IAS computer). It consists of

- A main memory, which stores both data and instruction
- An arithmetic and logic unit (ALU) capable of operating on binary data
- A control unit, which interprets the instructions in memory and causes them to be executed
- Input and output (I/O) equipment operated by the control unit

This structure was outlined in von Neumann's earlier proposal, which is worth quoting at this point:

First: *Because the device is primarily a computer, it will have to perform the elementary operations of arithmetic most frequently. At any rate a central arithmetical part of the device will probably have to exist and this constitutes the first specific part: CA.*

Second: *The logical control of the device, that is, the proper sequencing of its operations, can be most efficiently carried out by a central control organ. By the central control and the organs which perform it form the second specific part: CC*

Third: *Any device which is to carry out long and complicated sequences of operations (specifically of calculations) must have a .....*

नोट – *प्रिय पाठकों , यह अध्याय अभी यहीं समाप्त नही हुआ है यह एक सैंपल मात्र है / इसमें अभी और भी काफी कंटेंट पढ़ना बाकी है जो आपको* ***राजस्थान कंप्यूटर अनुदेशक (शिक्षक)*** *के इन कम्पलीट नोट्स में पढ़ने को मिलेगा / यदि आपको*

- **Computer Components**

COMPUTER FUNCTIONS –

The basic function performed by a computer is execution of a program, which consists of a set of instructions stored in memory. Instruction processing consists of two steps: The processor reads (fetches) instructions from memory one at a time and executes each instruction. Program execution consists of repeating the process of instruction fetch and instruction execution.

The processing required for a single instruction is called an instruction cycle. Using the simplified two-step description given previously, the instruction cycle is depicted in Figure 1.5. The

two steps are referred to as the fetch cycle and the execute cycle. Program execution halts only if the machine is turned off, some sort of unrecoverable error occurs, or a program instruction that halts the computer is encountered.

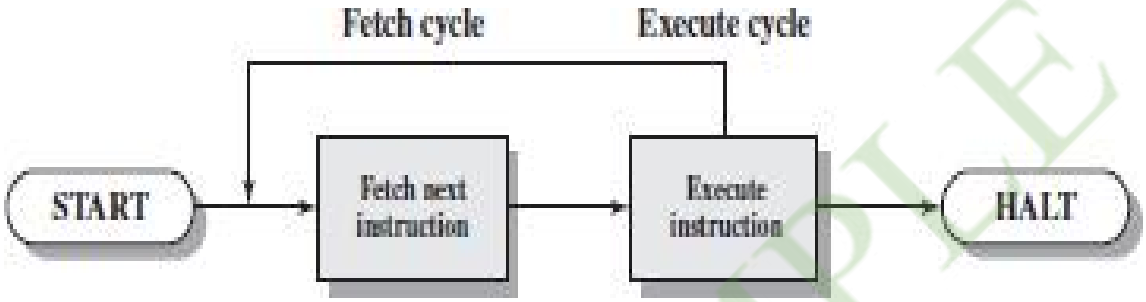


Figure 1.5 Basic Instruction Cycle

Instruction Fetch and Execute

At the beginning of each instruction cycle, the processor fetches an instruction from memory. The program counter (PC) holds the address of the instruction to be fetched next, the processor always increments the PC after each instruction fetch so that it will fetch the next in- struction in sequence.

For example, consider a computer in which each instruction occupies one 16-bit word of memory. If the program counter is set to location 300. The processor will next fetch the instruction at location 300. On next instruction cycles, it will fetch instructions from locations 301,302,303,and so on.

The fetched instruction is loaded into a register in the processor known as the instruction register (IR). The processor interprets the instruction and performs the required action. In general, these actions fall into four categories:-

- **Processor-memory:** Data may be transferred from processor to memory or from memory to processor.
- **Processor-I/O:** Data may be transferred to or from a peripheral device by transferring between the processor and an I/O module.
- **Data processing:** The processor may perform some arithmetic or logic operation on data.

- **Control:** An instruction may specify that the sequence of execution be altered. For example, the processor may fetch an instruction from location 149, which specifies that the next instruction be from location 182. The processor will remember this fact by setting the program counter to 182.Thus,on the next fetch cycle, the instruction will be fetched from location 182 rather than 150.

An instruction's execution may involve a combination of these actions. Consider a simple example using a hypothetical machine that includes the characteristics listed in Figure 1.6. The processor contains a single data register, called an accumulator (AC). Both instructions and data are 16 bits long. Thus, it is convenient .....

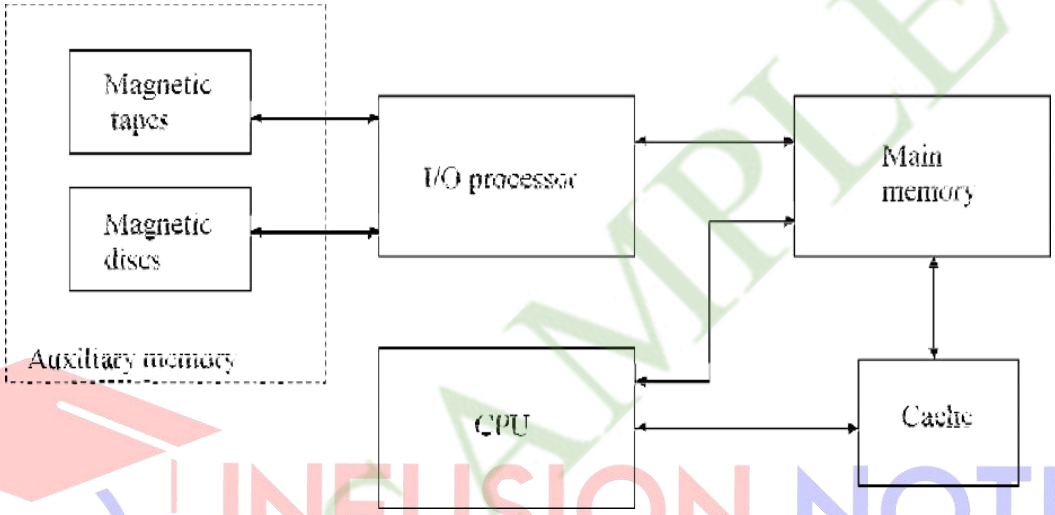
नोट – प्रिय पाठकों , यह अध्याय अभी यहीं समाप्त नही हुआ है यह एक सैंपल मात्र है / इसमें अभी और भी काफी कंटेंट पढ़ना बाकी है जो आपको **राजस्थान कंप्यूटर अनुदेशक (शिक्षक)** के इन कम्पलीट नोट्स में पढ़ने को मिलेगा / यदि आपको हमारे नोट्स के सैंपल अच्छे लगे हों तो कम्पलीट नोट्स खरीदने के लिए हमारे संपर्क नंबर पर कॉल करें , हमें पूर्ण विश्वास है कि ये नोट्स आपकी **राजस्थान कंप्यूटर अनुदेशक (शिक्षक)** की परीक्षा में पूर्ण संभव मदद करेंगे , धन्यवाद /

- **Memory Organization I/O Organizaton**

MEMORY HIERARCHY -

- The memory unit is an essential component in any digital computer since it is needed for storing programs and data. A very small computer with a limited application may be able to fulfill its intended task without the need of additional storage capacity.
- Most general-purpose computers would run more efficiently if they were equipped with additional storage beyond the capacity of the main memory.
- It is more economical to use low-cost storage devices to serve as a backup for storing the information that is not currently used by the CPU.
- The memory unit that communicates directly with the CPU is called the **main memory**. Devices that provide backup storage are called **auxiliary memory**. The most common auxiliary memory devices used in computer systems are magnetic disks and tapes. They are used for storing system programs, large data files, and other backup information. Only programs and data currently needed by the processor reside in main memory. All other information is stored in auxiliary memory and transferred to main memory when needed.

- *The memory hierarchy system consists of all storage devices employed in a computer system from the slow but high-capacity auxiliary memory to a relatively faster main memory, to an even smaller and faster cache memory accessible to the high-speed processing logic.*



Memory hierarchy in computer system

- The main memory occupies a central position by being able to communicate directly with the CPU and with auxiliary memory devices through an I/O processor.
- When programs not residing in main memory are needed by the CPU, they are brought in from auxiliary memory. Programs not currently needed in main memory are transferred into auxiliary memory to provide space for currently used programs and data.
- A special very-high speed memory called a **cache** is sometimes used to increase the speed of processing by making current programs and data available to the CPU at a rapid rate. The cache memory is employed in computer systems to compensate for the speed differential between main memory access time and processor logic.
- CPU logic is usually faster than main memory access time, with the result that processing speed is limited primarily by the speed of main memory.
- A technique used to compensate for the mismatch in operating speeds is to employ in extremely fast, small cache between the CPU and main memory whose access time is close to processor logic clock cycle time.
- The reason for having two or three levels of memory hierarchy is economics.
- As the storage capacity of the memory increases, the cost per bit for storing binary information decreases and the access time

of the memory becomes longer.

- The overall goal of using a memory hierarchy is to obtain the highest-possible average access speed while minimizing the total cost of the entire memory system.
- Auxiliary and cache memories are used for different purposes. The cache holds those parts of the program and data that are most heavily used, while the auxiliary memory holds those parts that are not presently used by the CPU. Moreover, the CPU has direct access to both cache and main memory but not to auxiliary memory. The transfer from auxiliary to main memory is usually done by means of direct memory access of large blocks of data. The typical access time ratio between cache and main memory is about 1 to 7. For example, a typical cache memory may have an access time of 100ns, while main memory access time may be 700ns. Auxiliary memory average access time is usually 1000 times that of main memory. Block size in auxiliary memory typically ranges from256 to 2048 words, while cache block size is typically from 1 to 16 words.
- Many operating systems are designed to enable the CPU to process a number of independent programs concurrently. This concept, called **multiprogramming**, refers to the existence of two or more programs in different parts of the memory hierarchy at the same time.
- In a multiprogramming system, when one program is waiting for

input or output transfer, there is another program ready to utilize the CPU.

- Computer programs are sometimes too long to be accommodated in the total space available in main memory.
- When the program or a segment of the program is to be executed, it is transferred to main memory to be executed by the CPU.
- It is the task of the operating system to maintain in main memory a portion of this information that is currently active.
- The part of the computer system that supervises the flow of information between auxiliary memory and main memory is called the **memory management system.**

MAIN MEMORY –

- The main memory is the central storage unit in a computer system. It is a relatively large and fast memory used to store programs and data during the computer operation.
- The principal technology used for the main memory is based on semiconductor integrated circuits.
- Integrated circuit RAM chips are available in two possible operating modes, **static** and **dynamic.** The static RAM consists essentially of internal flip-flops that store the binary information. The stored information remains valid as long as power is applied to unit. The dynamic RAM stores the binary

information in the form of electric charges that are applied to capacitors. The capacitors are provided inside the chip by MOS transistors. The stored charge on the capacitors tends to discharge with time and the capacitors must be periodically recharged by refreshing the dynamic memory.

- The dynamic RAM offers reduced power consumption and larger storage capacity in a single memory chip.
- The static RAM is easier to use and has shorted read and write cycles.
- Most of the main memory in a general-purpose computer is made up of RAM integrated circuit chips, but a portion of the memory may be constructed with ROM chips.

RAM refers to a random-access memory, but it is used to designate a read/write memory to .....

नोट – प्रिय पाठकों , यह अध्याय अभी यहीं समाप्त नही हुआ है यह एक सैंपल मात्र है / इसमें अभी और भी काफी कंटेंट पढ़ना बाकी है जो आपको **राजस्थान कंप्यूटर अनुदेशक (शिक्षक)** के इन कम्पलीट नोट्स में पढ़ने को मिलेगा / यदि आपको हमारे नोट्स के सैंपल अच्छे लगे हों तो कम्पलीट नोट्स खरीदने के लिए हमारे संपर्क नंबर पर कॉल करें , हमें पूर्ण विश्वास है कि ये नोट्स आपकी **राजस्थान कंप्यूटर अनुदेशक (शिक्षक)** की परीक्षा में पूर्ण संभव मदद करेंगे , धन्यवाद /

- ***Operating System Overview –***

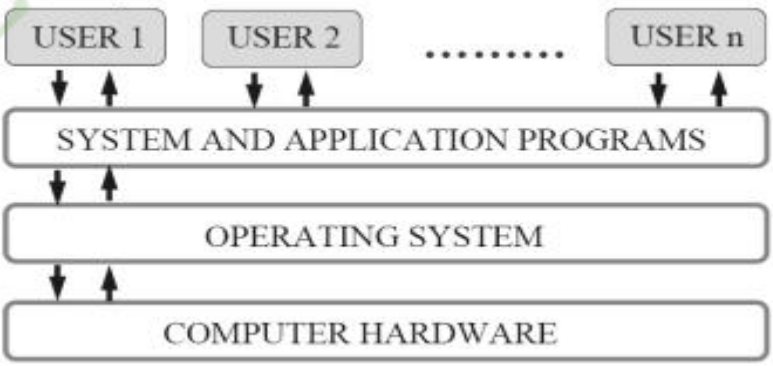
I. An ***Operating System*** can be defined as an ***interface between user and hardware***.

II. It is responsible for the execution of all the processes, Resource Allocation, CPU management, File Management and many other tasks.

III. An operating system (OS) is the program that, after being initially loaded into the computer by a boot program, manages all of the other application programs in a computer.

IV. The application programs make use of the operating system by making requests for services through a defined application program interface (API).

V. In addition, users can interact directly with the operating system through a user interface, such as a command-line interface (CLI) or a graphical UI (GUI).



Operating System Definitions –

I. Resource allocator – manages and allocates resources.
II. Control program – controls the execution of user programs and operations of I/O devices .
III. Kernel – The one program running at all times (all else being application programs).

History of Operating Systems –

I. The first computer, Z1, was made in 1936 – 1938. Unfortunately, this computer ran without an operating system.
II. Twenty years later, the first-ever operating system was made in 1956.
III. In the 1960s, bell labs started working on building UNIX, the first multitasking operating system.
IV. In 1977 the apple series came into existence. Apple Dos 3.3 was the first disk operating system.
V. In 1981, Microsoft built the first operating system called DOS by purchasing 86 – DOS software from a Seattle company.
VI. The most famous Microsoft windows came into existence in 1985 when MS-DOS was paired with GUI, a graphics environment.

Functions of Operating System –

I. **Processor Management:** An operating system manages the processor's working by allocating various jobs to it and ensuring that each process receives enough time from the processor to function properly.

II. **Memory Management:** An operating system manages the allocation and deallocation of the memory to various processes and ensures that the other process does not consume the memory allocated to one process.

III. **Device Management**: There are various input and output devices. An operating system controls the working of these input-output devices. It receives the requests from these devices, performs a specific task, and communicates back to the requesting process.

IV. **File Management:** An operating system keeps track of information regarding the creation, deletion, transfer, copy, and storage of files in an organized way. It also maintains the integrity of the data stored in these files, including the file directory structure, by protecting against unauthorized access.

V.**Security:** The operating system provides various techniques which assure the integrity and confidentiality of user data. Following security measures are used to protect user data:

a) Protection against unauthorized access through login.

b) Protection against intrusion by keeping Firefall active.

c) Protecting the system memory against malicious access.

d) Displaying messages related to system vulnerabilities.

VI. **Error Detection:** From time to time, the operating system checks the system for any external threat or malicious software activity. It also checks the hardware for any type of damage. This process displays several alerts to the user so that the appropriate action can be taken against any damage caused to the system.

VII. **Job Scheduling:** In a multitasking operating system where multiple programs run simultaneously, the operating system determines which applications should run in which order and how time should be allocated to each application.

Components

OS has two parts.

(1)Kernel.(2)Shell.

I. Kernel is an active part of an OS i.e., it is the part of OS running at all times.

II. It is a programs which can interact with the hardware. Ex: Device driver, dll files, system files etc.

III. Shell is called as the command interpreter.

IV. It is a set of programs used to interact with the application programs.

V. It is responsible for execution of instructions given to OS (called commands).

VI. Operating systems can be explored from two viewpoints: the user and the system.

User View: From the user's point view, the OS is designed for one user to monopolize its resources, to maximize the work that the user is performing and for ease of use.

System View: From the computer's point of view, an operating system is a control program that manages the

Components of Operating System

Now to perform the functions mentioned above, the operating system has two components:

1. Shell
2. Kernel

Shell-

I. Shell handles user interactions. It is the outermost layer of the operating system and manages the interaction between user and operating system by:
   a. Prompting the user to give input
   b. Interpreting the input for the operating system
   c. Handling the output from the operating system.

II. Shell provides a way to communicate with the operating system by either taking the input from the user or the shell script.

III. A shell script is a sequence of system commands that are stored in a file.

Kernel-

I. The kernel is the core component of an operating system which acts as an interface between applications, and the data is processed at the hardware level.

II. When an OS is loaded into memory, the kernel is loaded first and remains in memory until the OS is shut down.

III. After that, the kernel provides and manages the computer resources and allows other programs to run and use these resources. T

IV. he kernel also sets up the memory address space for applications, loads the files with application code into memory, and sets up the execution stack for programs.

The kernel is responsible for performing the following tasks:

a. Input-Output management
b. Memory Management
c. Process Management for application execution.
d. Device Management
e. System calls control

Types of Operating System -

Main types:-

1. Batch OS
2. Multiprogramming OS
3. Multitasking OS
4. Distributed OS

5. Network OS
6. Real Time OS
7. Time Sharing OS
8. Multiprocessing OS

I. Batch Operating System

History –

I. In the early 1950s, the first batch processing systems were created at a research center named General Motors Research Laboratories.
II. After this, in the early 1960s, many improvements were made in the technology of batch operating systems by the IBM company.
III. In the 1960s, a group of students and teachers from the University of Michigan (University of Michigan) made several improvements to the batch operating system.

OverView –

I. "The operating system is termed as "batch operating" because the input data (job) are collected into batches or sets of records with similar needs and each batch is processed as a unit(group).
II. The output is another batch that can be reused for computation."
III. In this, the command or instruction to be performed by the user and the program is addressed by the word **Job**.

IV. In batch operating system, the user does not interact directly with the operating system, rather all the instructions are given to the operator.

V. The operator analyzes the instructions received by the user and creates a bunch of instructions with similar properties.

After that the operator sends the instructions to the CPU (Central Processing Unit) to .....

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- **What is Multithreading?**

I. Multithreading is the ability of the program to manage and execute multiple requests at the same time.

II. Multiple threads are created in the single process.

III. In the above example, if there is no multi-threading, we can not create multiple threads to run multiple instances of notepad application. There will be only one notepad thread working.

IV. This is a high-level understanding of the process and thread. Let's get into the detail to see how the Operating System manages process and thread, internally.

The OS supports the threads that can provided in following two levels:

User-Level Threads

I. User-level threads implement in user-level libraries, rather than via systems calls, so thread switching does not need to call operating system and to cause interrupt to the kernel.

II. In fact, the kernel knows nothing about user-level threads and manages them as if they were single-threaded processes.

Advantages:

I. User-level threads do not require modification to operating systems.

II. Simple Representation: Each thread is represented simply by a PC, registers, stack and a small control block, all stored in the user process address space.

III. Simple Management: This simply means that creating a thread, switching between threads and synchronization between threads can all be done without intervention of the kernel.

IV. Fast and Efficient: Thread switching is not much more expensive than a procedure call.

Disadvantages:

I. There is a lack of coordination between threads and operating system kernel.

II. User-level threads require non-blocking systems call i.e., a multithreaded kernel.

Kernel-Level Threads

I. In this method, the kernel knows about and manages the threads.

II. Instead of thread table in each process, the kernel has a thread table that keeps track of all threads in the system.

III. Operating Systems kernel provides system call to create and manage threads.

Advantages:

Because kernel has full knowledge of all threads, Scheduler may decide to give more time to a process having large number of threads than process having small number of threads.

Kernel-level threads are especially good for applications that frequently block.

Disadvantages:

I. The kernel-level threads are slow and inefficient.

II. For instance, threads operations are hundreds of times slower than that of user-level threads.

III. Since kernel must manage and schedule threads as well as processes.

IV. It require a full thread control block (TCB) for each thread to maintain information about threads.

V. As a result there is significant overhead and increased in kernel complexity.

Difference Between Process and Thread

I. The thread is also called a lightweight process. It requires fewer resources as compared to the process to run.

II. One single process can consist of multiple threads.

III. Every process requires its own address space to run on a processor. Whereas threads within a single process share the single address space. So threads are easier to create than process.

IV. Threads read and write at the same place. It is good and easy for communication between multiple threads in the single process.

V. The data communications between multiple processes are difficult and it is carried out by IPC (inter-process communication).

VI. Context switching overhead is less in the thread as compare to process. So threads decrease overall execution time and the cost of the communication.

VII. Threads are useful to execute lightweight tasks whereas processes are responsible for running heavyweight tasks.

What is Inter Process Communication?

I. Inter Process Communication (IPC) is a capability supported by operating system that allows one process to communicate with another process.

II. The processes can be running on the same computer or on different computers connected through a network .

III. Inter Process Communication (IPC) enables one application to control another application, and for several application to share the same data without interfering with one another.

Types of communication

1. Between related processes initiating from only one process, such as parent and child processes.

2. Between unrelated processes, or two or more different processes.

Synchronization

I. Synchronization is a necessary part of interprocess communication processes.

II. It is provided by the interprocess control mechanism.

III. Some of the methods to provide synchronization are as follows –

A. Semaphore

I. A semaphore is a variable that controls the access to a common resource .....

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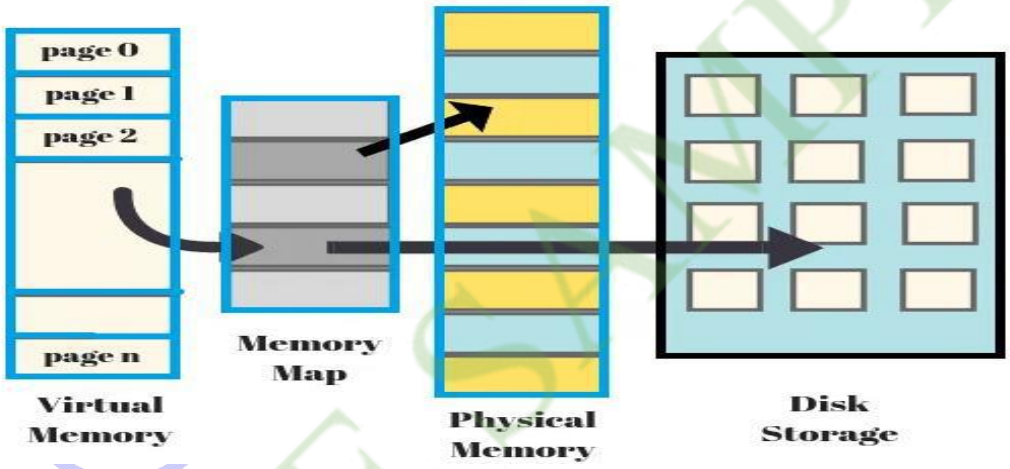
- **Virtual memory –**

Virtual memory is large secondary memory of operating system, and it allows to hardware and software of computer system to support for physical memory on transferring time of data from main memory to secondary memory such as hard disk.



Need of Virtual Memory-

I. Main objective of needing is virtual memory is to increase the storage space of running memory, without adding any external memory such as RAM (Random Access Memory).

II. If, any time computer's physical memory is totally occupied for other programs, but same time it needs to some extra memory then requests are forwarded to hard disk for swapping files like as virtual memory.

III.If, any time computer requires the extra more main memory (RAM), then it try to install in the machine, and it works as small area of disk for fulfill system needs.

Advantages of Virtual Memory

I.Assigning the memory is very cheap and effective way.

II.Page mapping is done good manner.

III.Virtual memory helps to trash the external fragmentation.

IV.While using of huge virtual space, vast programs can be implemented.

V.Virtual memory allows too fast and easy processes.

VI.Due to store of programs in the virtual memory, not need more memory space.

VII.All data (page frames) can be distributed on the entire physical memory.

VIII.Allowing the very effective swapping

IX.It allows the multi programming environment.

X.It is capable to operate multiple applications concurrently.

XI.It allows the flexibility because their large programs can be fitted into small size programs.

XII.It allows sharing common data between their memories.

XIII.All processes can get large size to physical memory.

XIV.It allows reading all data from hard disk, when to need.

XV.It allows replacing any code in physical memory without needing relocation.

XVI.It helps to improve the performance of CPU.

XVII.It has no any boundation for all degree of multi programming.

XVIII.It allows huge virtual address space to physical memory.

XIX.It allows allotting the specific segment of program for execution of particular program, so it helps to enhance the speed of execution time.

XX.It allows the protection between two programs.

- **Disadvantages of Virtual Memory –**

I.There are some limitations of virtual memory such as –

II.While using of virtual memory, all application's speed are getting slow.

III.It consumes more hard disk space.

IV.Lack of system stability

V.It is not capable to deliver the equal performance like as RAM.

VI.Due to virtual memory, system gets degrade.

VII.It consumes more time between switching the applications.

VIII.Increase the software complexity and hardware cost.

IX.Required the best hardware support

X.Kernel developers require a profound understanding of the hardware, if they are using Virtual memory.

What is Deadlock? –

I.A deadlock is a common situation in operating systems where a process waiting for a resource can be executed because that resource is currently

held by another process and is being utilised for its execution, therefore, the process does not get executed.

II. Moreover, many other processes may also be waiting for a resource to be released.

III. A deadlock situation is created

IV. Let us assume that there are two processes called P1 and P2.

V. Resources R1 and R2 are assigned to them respectively.

VI. So if P1 needs R2 to complete its execution, but it is held by P2, P1 has to wait. Similarly, P2 may be waiting for R1 that is held by P1.

VII. Thus, P2 has to wait until P1 has released the resource.

VIII. As a result, a deadlock situation arises and both processes are not able to complete their execution. As the processes are blocked, the system may become unresponsive.

Condition for Deadlock

There are certain conditions that have to occur for a deadlock. They are as follows:

1. Mutual Exclusion

I. This means that resources can be used in a mutually exclusive way.

II. So, two processes will not be able to access the same resource at a particular point in time.

III. At least one resource has to be acquired by a process in a non-shareable mode.

IV. If not, more than one process will not be able to access a resource at a time.

2. Hold and Wait

This is a condition where a process is holding at least one resource for its execution. This process is also waiting for another resource, which is being held by another process.

3. No Pre-emption

I. This means that if a resource is assigned to a particular process, it cannot be pre-empted.

II. The resource cannot be allocated to another process unless it is released. The resource has to voluntarily release for another process to utilise it.

4. Circular Wait

I. In this situation, several processes are waiting for a resource that is allocated to a particular process.

II. This waiting happens is the cyclic manner where the last process waits for the initial process to release a resource.

For example, process P1 waits for a process held by P2, that is waiting for a resource assigned to P3. P3 is waiting for a resource that is currently held by P4. P4 is waiting for P1 to release a .....

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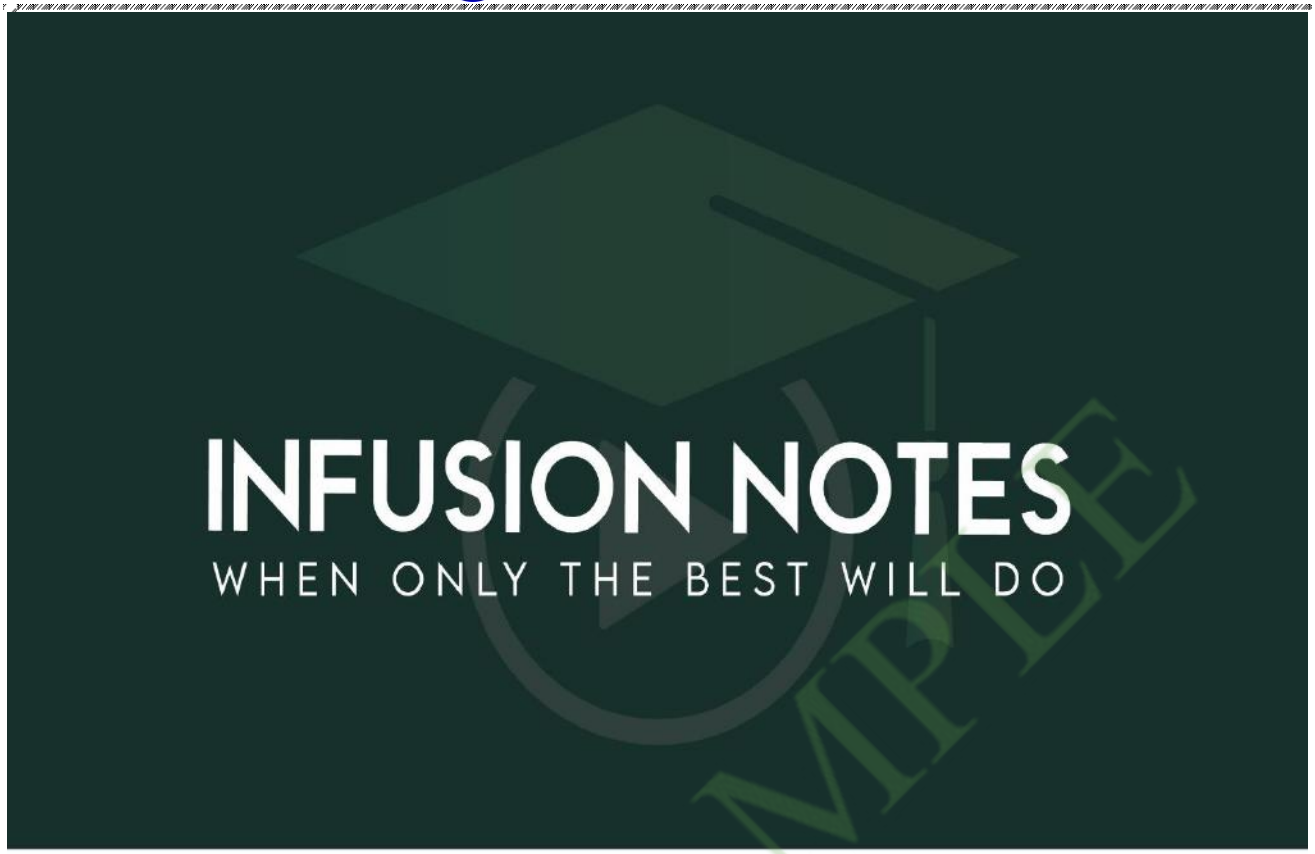
RAJASTHAN VDO 2021	28 दिसंबर (2nd शिफ्ट)	57 of 100	
U.P. SI 2021	14 नवम्बर 2021 1st शिफ्ट	91 of 160	
U.P. SI 2021	21 नवम्बर 2021 1st शिफ्ट	89 of 160	

अन्य परीक्षाओं में भी इसी तरह प्रश्न आये हैं Proof देखने के लिए हमारे youtube चैनल (Infusion Notes) पर इसकी वीडियो देखें या हमारे नंबरों पर कॉल करें /

संपर्क करें – 8233195718, 9694804063, 8504091672



II.