INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) & COMPUTER NETWORKING

For

D.I.T

PART-I

and

F.Sc, BSc. BCS
According to New
Syllabus of DIT
Khyber Pakhtunkhwa Board of Technical Education
Khyber Pakhtunkhwa Trade Testing Board
EDITION 2021 / 22

By

Can be had from
Shah Faisal Khan
Cell # 03335712412

Waqar Ahmad
Cell # 03005707585

Nasir Book Depot
Iqbal Plaza Near City Centre Dhaki Nailbandi
Qissa Khawani Peshawar Ph-# 091-257227

Kakar Brothers Book Seller
Insaf Market Dhaki Nailbandi Qissa Khawani
Peshawar Ph-# 091-2591816

Shahid Khan
Ph # 0316-3329837

Printed in March, 2021

PREFACE

Computers are general-purpose electronic device to help in data storage, processing and communication of information. Modern computers can process information not only in text form but also in graphic, audio or video form. Today, they have found their way into application areas that were not feasible twenty years ago. Revolutionary changes have occurred in the field of information technology during this period.

The edition of this book has been written according to the new syllabus for D.IT-I. It presents an introduction to ICT and Networking it also includes a practical introduction to Networking.

I hope this book will not only benefit the students but also the teachers and all other users in a better way for learning about computers and other fields of information technology.

M. Khalid Khan.

ACKNOWLEDGEMENTS

The author wishes to acknowledge the assistance of the following reviewers whose constructive criticism and suggestions helped invaluably in shaping the form and content of this text.

Mr. Hazrat Zubair, Associate Professor in Comp. Sc,. GCMS-2, Ring Road, Peshawar.
Mr Riaz Assistant Professor GCMS-1 Mardan.
Mr Fzali Akbar Lecturer Computer Science GCMS-1 Mardan
Mr Rahat Ullah Lecturer Computer Science GCMS-2 Mardan
Mr Tufail Lecturer Computer Science GCMS-2 Mardan
Mr Muhammmad Waseem Lecturer Compter Science GCMS, Hari Pure
Mr Miskeen Shah Lecturer Computer Science GCMS Hari Pure Mardan
Mr. Rahim Shah, Lecturer in Computer Science GCMS, Peshawar
Mr. Younas Lecturer in Computer Science, GCMS, Thana
Mr. Riaz Assistant Professor in Computer Science, GCC, Swat
Mr. Naeem Ullah Lecturer in Computer Science, GCC, Swat
Mr. Yaseen Assist Professor in Computer Science, GCC Kohat
Mr. Mujeeb ur rehman Lecturer in GCMS, Peshawar

My Special thanks are to my honourable friend and all staff member of Government College of Management Sciences, Peshawar for their valuable suggestions.

Thanks to all my colleagues especially Mr. Tariq Siddique, Ali Yar and Naveed Iqbal for participating in various technical discussions which has led to the significant improvement in the book.

M Khalid Khan

Introduction to Information Technology

Introduction of computer

Storage Devices

Software design and algorithm

Productive Enhancement Software Packages

Introduction of Number System And their inter conversion

Virus, Antivirus Fundamental Networks

CHAPTER-I

Q. What is Data? Explain different types of data.

A. Data is a plural form of the Latin word Datum. The collection of fact and figure is called Data OR any thing in raw form. Data cannot be used for decision making or action taking. e.g. Name, Address, Number, Phone Number, Roll No etc.

Types of data

There are different types of data

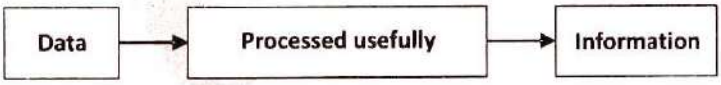
I. Alphabetic data type:-It consist letter from A-Z capital or from a-z small letter. e.g Abid Peshawar, Pakistan, Khan
ii. Numeric data type;- It consist of digit from 0-9 e.g 123, 567 etc
iii. Alphanumeric data type:-It consist alphabetic letter as well as numeric digit. Street no A/10 etc
iv. Graphic data: It consists tables, charts, graphics and statements
v. Audio data: It consists only sounds. For example radio news.
vi. Video data: It consists photos, image and moving picture. Such as TV news.
vii. Mixed data: It consists more than one type of data. Such as the combination of audio and video.

Q. What is Information?

A. To organize the Data in meaningful form upon which people can take necessary decision is called Information. e.g. 2,1,5,4 when sorted it become 1,2,4,5 which is information. Information is the meaningful, process d data, which is relevant and accurate and there by can be used in decision-making. Examples are voucher, bills, fee registration cards or library cards.

Differentiate between Data and Information

DATA	INFORMATION
Data is a set of raw facts.	Information is processed form of data.
Data is used as input in the computer	Information is the output of computer
Data is not meaningful	Information is meaningful
Data is asset of organization and is not available to people for sale.	Information is normally available available for sale.
Data is an independent entity	Information depend on data
Data is not used in decision - making	Information is very important for decision-making
Data is use rarely	Information is use frequently.



e.g. 2,1,5,9,7 Sorted 1,2,5,7,9

Remember that computer is one of the information systems that convert raw data into useful information.

DATA PROCESSING CYCLE

Data processing life cycle is a collection of steps required to convert data into information. Different steps of data processing life cycle are as follows.

INPUT: in this steps, data is collected and given to the computer for processing.

PROCESS: In this steps, computer processes data to generate information.
OUTPUT: In this step, the information is given to the user as output.
STORAGE: In this steps, the information is stored in the computer for future use. This steps is optional.

CLASSIFICATION OF DATA PROCESSING SYSTEM

MANUAL/CONVENTIONAL DATA PROCESSING

The Conventional Data Processing/Traditional Data Processing system is the manual method of transforming data into information. The human beings themselves collect data, classify and arrange the data, perform manual calculation and hence produce the required output result. It is very simple and inexpensive. Upto the 20th century almost all data processing was done manually. Clerical persons used paper, pen, and pencil to maintain records in offices. Such data processing caused frequently clerical mistakes and hence due to these miss-recorded transactions, the Company record was to be misrepresented. Information was often received too late to serve the organization purposes.

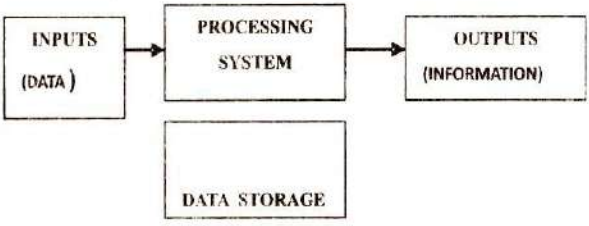
ELECTRONIC DATA PROCESSING (COMPUTER BASED DATA PROCESSING SYSTEM)

An Information System that uses Computer and their hardware and software is called Electronic data processing, Computer-Based Data processing or Computer Based Information System. Electronic Data Processing or Computer Based Information System uses Computer hardware and software, the internet and other telecommunication system, network, Computer based data resource management technique and many other information technologies to transform data resources into information products for consumers and business professionals.

Electronic computers complete all data manipulation and file updating electronically rather than mechanically. This increased data processing productivity and reduced its cost. The speed, accuracy and reliability of computers are more than Traditional data processing.

DATA PROCESSING SYSTEM:-

The system that process data and produce information is called Data processing system or Information processing system. The diagrammatic representation of DPS is given below.



MODEL OF DATA PROCESSING SYSTEM

There are mainly two of data processing systems which are discuss in previous topics.

ADNANTAGES OF ELECTRONIC DATA PROCESSING

Electronic data processing reshaping the basics of business. Now a day customer service, operation, products and marketing strategic and distribution dependent on electronic data processing. Electronic data processing system perform three important roles in any type of organization.

1. Support of business operations.
2. Support of managerial decision making
3. Support of strategic competitive advantage.

In to day business and every field of life electronic data processing is important component. Through electronic data processing it is possible to become a global enterprise. Electronic data processing is used to restructure work by transforming business process.

Electronic data processing is used to simplified complex process. Receiving, recording, processing and retrieval of record in second. It is possible to access the desired record in second. Electronic data processing permits the organization to create, develop, and maintain database. Using electronic data processing to send, receive email and faxes. Access to internet and remote computer is possible through it. EDP process thousand of transaction in second and the processing speed is very high. Electronic data processing process the transaction with high accuracy.

WHAT IS INFORMATION TECHNOLOGY? DISCUSS ELEMENT OF IT/ ELEMENTS OF DATA PROCESSING SYSTEM:-

The merging of computer and communication is called Information Technology. IT is a technology that merges computing with high-speed communication links carrying data, sound, image, graph, and video. Computer and communication are the parents of the information age.

It manages a network of computer. Creating WEB Pages, producing video, selling, buying, and perform any type of business activity on the Internet.

For example telephone, radio equipment and switches used for voice communication. Managing video conferencing etc.

Through Internet, you can communicate with any computer user having an internet connection any where in the world. You can exchange message with him, you can talk to him through computer or phone, you can send any file to him, you can receive any file from him and you can have on-line conversation with him through typing from keyboard. A computer and communication system is made up six elements.

1) People 2) Procedure 3) Data/Information 4) Hardware 5) Software
6) Communication

1

1-PEOPLES

It means the users or people who runs and execute the entire data processing task and computer installations or the people who works in the data processing environment. The personnel include System Analysts, Programmers, Data entry operators, and Data processing officers.

2-Procedure

Procedures are rules, policies, and methods for operating computers. The operation of a data processing system requires procedures for use in obtaining and preparing data in order to operate the computer and for distributing the output from the computer. This procedure includes control steps such as actions to be taken to show errors in the data and malfunctioning of the equipment etc.

3-DATA

Fact and figure is called data. Data is raw material of IS. Data can take many forms, including Text data, Audio data, video data, voice data graphics and image data.

4-HARDWARE

Physical parts of computer system. For example input devices, output devices and CPU such as keyboard, Mouse, motherboard, CD-ROM etc.

5-SOFTWARE

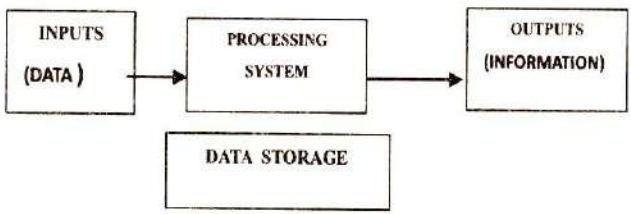
The Software consists of programs whose purpose is to communicate with computer. The Software includes operating system i.e. MS-DOS,PC-DOS,UNIX,,XENIX, and Linux etc. General purpose programs i.e. database packages like FoxPro, Dbase, Java etc.

6-Communication

Data Communication/Telecommunication technologies and network like the internet which is necessary for all types of organization and their computer-based data processing. Telecommunication network consist of computers, communications processor and other device interconnected by communication media and control by communication soft ware.

Data processing systems:

The system that process data and produce information is called Data processing system or Information processing system



MODEL OF DATA PROCESSING SYSTEM

EXPLAIN MANUAL AND ELECTRONIC DATA PROCESSING SYSTEM. WHAT IS THE DIFFERENCE BETWEEN THESE TWO?

Conventional Data Processing(CDP)/Manual Data Processing:-

The Conventional Data Processing/Traditional Data Processing system is the manual method of transforming data into information. The human beings themselves collect data, classify and arrange the data, perform manual calculation and hence produce the required output result. It is very simple and inexpensive. Upto the 20th century almost all data processing was done manually. Clerical persons used paper, pen, and pencil to maintain records in offices. Such data processing caused frequently clerical mistakes and hence due to these miss-recorded transactions, the Company record was to be misrepresented. Information was often received too late to serve the organization purposes.

Electronic Data Processing (Computer Based data Processing System)

An Information System that uses Computer and their hardware and software is called Electronic data processing, Computer-Based Data processing or Computer Based Information System. Electronic Data Processing or Computer Based Information System uses Computer hardware and software, the internet and other telecommunication system, network, Computer based data resource management technique and many other information technologies to transform data resources into information products for consumers and business professionals.

Electronic computers complete all data manipulation and file updating electronically rather than mechanically. This increased data processing productivity and reduced its cost. The speed, accuracy and reliability of computers are more than Traditional data processing.

CHAPTER-2

(INTRODUCTION TO COMPUTER)

Q. Define Computer?

Ans. Computer:

Computer is an electronic device, which can accept the input data, process the data, and gives the result of the process data according to instruction.

A computer is a system, of an interrelated, interacting components that performs the basic function of input, processing, output, storage, and control. There are three basic component of computer that is Input, CPU, and Output.

Q) Explain History of Computer?

History of Computers: -

The history of Computer is very old, i.e. it goes back to some 500 years BC. The first computing machine was used by the Chinese before 15th century. The name of this machine was Abacus.

However in 1812 an English mathematician from Cambridge University, Mr. Charles Babbage designed a machine called DIFFERENCE ENGINE. This machine was capable of calculating powers of numbers. Babbage also gave the idea of an ANALYTICAL ENGINE, which was supported to be general-purpose machine having the ability to calculate various arithmetic and/or algebraic formulas, store data and print results. He died soon and never converted his dreams into reality.

The analytical engine was not a successful machine but it gave birth to the research in the field of computers.

In 1946, John Mauchly and J.P. Eckert developed an Electronic, Numerical Integrator and Computer (ENIAC) at the Moore school of Engineering and Technology, Pennsylvania USA. This was the first truly successful computer after Mark-I and Mark-II developed at Manchester University. There were three main drawbacks in the ENIAC as follows:

1. It used serial lines for processing.
2. No storage facility was available.
3. It used decimal numbers instead of binary number system.

These problems were successfully overcome with the development of John Von Neumann's Electronic Discrete Variable Automatic Computer (EDVAC) developed in 1950. It was the first computer capable of doing non-scientific work. Besides, most of today's computers are based on the working of EDVAC. The development of these machines materialized the existence of computers and they became a commercial entity used in many government organizations. As EDVAC was the first machine that was used by the people for solving their problems, but still it was not a useful machine because it could not solve all the problems of that time. Therefore, efforts

were made to develop such a machine, which can solve all our problems. In this connection, the scientists make developments from time to time and improve the previous machine into a latest one. Due to these improvements, we have now Computers, which can solve all types of problems.

Q) Discuss different Types of Computer (w.r.t. internal structure)?
There are three type of Computer
a) Digital Computers. b) Analog Computers. c) Hybrid Computers.

a) Digital Computers: -
In these Computers, information is represented by variables which having discrete values, i.e. it operates on the inputs that are ON-OFF switching. Digital computers process data, which is in the form of digits. In these Computers all operations take place at a very high speed and produce very accurate and precise results, e.g. Digital computer, Calculators, Digital Watches, etc.

b) Analog Computers: -
These machines process information, which is of, continues nature and which is not discrete or separate. An Analog computer is used for measurement. The speed of analog is fast but not so accurate. Analog computer measure Temperature, Pressure, Current Voltage and Depth etc. These quantities continue in nature and have millions of varieties. OR in other words we can say that in these Computers, information is represented in continues form, e.g.. Automobile Speed Meter, Current, Analog watch, etc.

Differentiate Between Analog and Digital Computers: -
Analog Computers measure while Digital Computers count. Analog Computers are fast but not so accurate, while Digital Computers are fast as well as more accurate.

c) Hybrid Computers: -
Hybrid Computers combine the properties of both Digital Computers and Analog Computers for solving the problems e.g. Hybrid Computers have the speed of Analog Computers and accuracy of Digital Computers. These Computers are used in some specialized applications. e.g. Flight Radar System, National Defense, Hybrid Watches, digital petrol pumps etc.

Q) Explain or discuss Classification of Computer (w.r.t size)
a) Micro Computers. b) Mini Computers. c) Mainframe Computers. d) Super Computers.

a) Mainframe Computers: -
These are the most expensive, largest and fastest Computers, used in large Organizations. Mainframes have the facilities to communicate with large amount of data and support several input and output devices. The cost of typical mainframe is in million rupees and can serve as much as 150 users.

These Computers have Memory of several hundred Mbs, and operate at a speed of measure in nanoseconds. e.g. IBM/360, IBM/3090, etc.

b) Mini Computers:-

These Computers are larger than PCs, both in size and other facilities such as speed, storage capacity, etc. These Computers have the capabilities to serve many Users at one time. They are costly as compared to PCs. Their speeds are rated between 1 and 50 MIPS. E.g. Vax/11730, IBM/8370, etc.

c) Micro Computers

These are also called Personal Computers (PC). These are the most popular digital Computers used in all fields of life. These are small in memory and have less processing capability. These are also called Chip Computers, because its entire circuitry is fabricated on a single chip. The microcomputer of today is equivalent to the main frame of tomorrow. e.g IBM-PC, XT, AT, Compatibles, 286, 386,486, 586, P-I, P-II, P-III, P-IV etc.

d) Super Computers:-

Super Computers are also called "Number Crunchers", because they are specialized Computers for dealing with numbers, i.e. they are capable of performing over 10 Mega flops (i.e millions floating point operations per second). These Computers are very much expansive. Two families of commercially available Super Computers are the GRAY-1 and Cyber205 built by Illiac-iv. These are specially used in Atomic reactor, defense system of NASA. (USA)

Q) Explain or discuss Classification of Computer w.r.t purpose.

We can divide the Computers into the following two types.

a) General Purpose Computers. b) Special purpose Computers.

General Purpose Computers:-

These Computers are used for solving a wide variety of problems in many areas such as Business, Education, Science, etc. General-purpose computers can store large amount of data and that is why most business enterprises use them. These Computers are used for multipurpose. For example, P.C, etc.

Special purpose Computers:-

These computers support highly specialized data processing activity. These Computers are used for solving problems of some special types. i.e these Computers are used to perform a single and special task e.g. Computers used in the Atomic Energy Commission, Computer used for eye sight etc.

Q) Explain different generation of computer ?

Generations of Computers:

Although, the development of Computers is a continuous process, however, it can be categorized into the following generations based on the technology used for the Computer systems.

1.First Generation (1945-1950):-

All the Computers developed in this generation were based on Vacuum-Tubes technology. For example, ENIAC (Electronic Numerical Integrator And Computer), Mark-I, Mark-II etc. The Computers of this generation were very slow, large, and expansive.

2. Second Generation (1950-1960):-

The Computers of this generation were based on Transistor technology(Vacuum tube replace by transistor) and they opened the gateway to the commercial development for sale of computers. The transistors were small in size, fast in operation and less expansive than vacuum tubes. Hence the Computers of this generation were small and less costly. Also the speed of these Computers was high. e.g. , EDVAC, IBM-1401.

3.Third Generation (1960-1970):-

The Computers of this generation were based on integrated circuits (ICs) technology (transistor replace by ICs). In early 1960 the electronic technology of solid-state was introduced. The development of integrated circuits (ICs) is called solid-state technology or Small Scale Integration (SSI). The integrated circuits (ICs) are the collection of many electronic devices like transistors on a single chip of silicon. This technology enabled the computers to enter into electronic revolution. Also the Computers of this generation were high in speed, accuracy and less in price. e.g. IBM-360 etc.

4. Fourth Generation (1970-1980):-

The Computers of this generation were based on Large Scale Integration (LSI) (ICs replace by LSI). In 1970 the technology was enhanced sufficiently to integrate all main functions of a computer using LSI on a single chip called Microprocessor. In this generation Microprocessor was introduced, due to which microcomputers were made. For example, IBM-PC etc.

5. Fifth Generation (1980-1990):-

The rapid progress in computer technology is still continued and active research is going on in different fields of computer technology but there is no well-defined categorization after fourth generation. The reason may be that now the developments are taking place in a variety of fields of computer hardware and software as compared to the previous developments, which mostly took place in the fields of electronics. As a result of that further grouping of computer developments is difficult. However in the field of software a new era has started called AI (artificial intelligence), which is the main field of study including ROBOTICS, COMPUTER VISION, COMPUTER LEARNING etc. Hence the Computers of this generation were based on the principles of AI and also in this generation, Software development was give more importance than Hardware, as a result of which Artificial Intelligence was introduced. e.g. Robotics, Computer Vision etc.

6.Sixth Generation(ANN'S)(Since 1990):-

The Computers of this generation are based on the principles of Artificial Neural Network System (ANNS). As a result, now the Computers can think and decide for solving different problems. e.g. Character recognition etc.

CHAPTER-3
HARDWARE

Q. Define Computer?
Ans. Computer:
Q. Define Computer?
Ans. Computer is an electronic device, which can accept the data, process the data, and gives the result/information of the process data according to instruction.

A computer is an interrelated combination of components that performs the basic function of input, processing, output, storage, and controlling, and provide information to end users.

Q) Discuss Different components (Input, CPU, Output)? Or Main Components of Computer:

Ans: There are three basic elements of a computer.
1- Input Unit 2-Processing Unit 3-Output Unit

1-Input Unit

The devices through which we enter the data and instructions (Programs) into the computer are called input devices. (e.g. keyboard, Mouse, Scanner etc)

2-Central Processing Unit (CPU)

Central Processing Unit (CPU) is the administrator section of computer. It is the brain of computer. CPU is located on motherboard. Data passes through CPU continually. Data come from RAM and other unit such as keyboard and drivers. CPU processes the data and sends it back to RAM and other units. CPU is connected to all input, output and storage devices and controls all the functions of these devices. CPU receives the data from input device; perform processing on data; and then sends the result of the process data to output devices.
The CPU is the collection of two units.

i) Control Unit (CU)

Control Unit is the nerve center of the computer. It controls all activities of computer system. The control unit direct and coordinate the entire Computer System in carrying out Program instruction. It accepts data from input device and sends it to the memory. From the memory the data are then transferred to ALU and send the result to the output unit.

ii) Arithmetic and Logic Unit (ALU)

This is the calculation section of Computer. All arithmetic operation like addition subtraction, multiplication and division as well as some logical operation are performed in this section. It consists of two units. **a- Arithmetic Unit b- Logic unit**

a-Arithmetic Unit

Arithmetic unit of the ALU performs basic arithmetic function as addition such as addition, subtraction, multiplication and division.

b- Logic Unit

Logic unit of the ALU performs logical operations like comparing two data items to find which data item is greater than, equal to, or less than the other.

3) Storage Unit (Primary Memory)

This memory is the place where the computer program and data are stored during processing. This memory is temporary storage unit for data, instructions and information. The storage unit is often called either main storage or internal storage or primary storage. There is usually two type's primary storage.

A)RAM:-

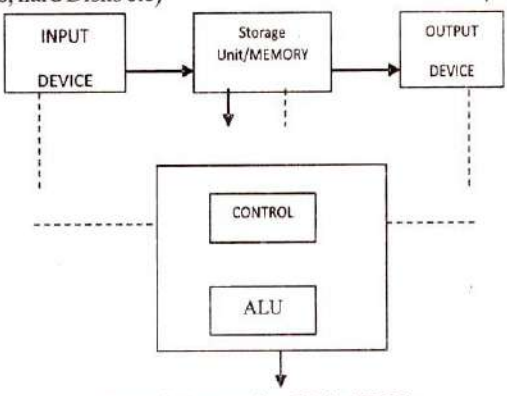
It stands for Random-Access-Memory or read/write Memory because information can either be read from or written to the RAM. RAM is called volatile or semiconductor memory. This is the memory whose information can be erased or changed. It is temporary memory. Any thing stored in RAM is lost when Computer is switched off.

B)ROM:-

It stands for Read-Only-Memory. Information can be read from ROM but we cannot write information to it. This is the memory whose information can be not changed. The information stored in it cannot be lost if we turn off the Computer. ROM is used to store permanent program. This information is available on small pieces of the memory called chips. It is also called non-volatile memory or semi-conductor memory.

4. Output Unit

The device through which the process information comes to outside world is called output devices. An output device can be used to store, display or print the information. (e.g. monitor, printer, floppy Disks, hard Disks etc)



Q) Define Input Device and discuss different input devices.

INPUT DEVICES

The device through which we enter data and program into the computer is called input device. There are many devices for input. These devices of a digital Computer are responsible for accepting programs and data from the outside world, feeding it to the Computer, and storing it into the Computer memory. These devices work under the control of Microprocessor. Some of the famous Input devices are as below Keyboards, mouse, scanners, microphone, video camera, touch screen, and optical scanning.

KEYBOARD:-

It is a very common input device that helps in keying-in the required information into the Computer. Keyboard can be used effectively to communicate with the Computers but it is very slow input device. The keyboard is just like a typical typewriter in shape but enhanced than that. It consists of normal Alphabetic, numeric, functions, and other special characters or control keys, which are not available in a typewriter.

POINTING DEVICES

An input device used to control a pointer on the screen is called pointing devices. A pointer is a small symbol that appears on the screen in graphical user interface. Some example of pointing devices is Mouse, Track ball, Joy stick etc.

a) MOUSE

A Mouse is a quick input device and is very small in size. Mouse is moved on a flat surface to control the movement of the cursor (pointer) on a screen. A mouse usually has two or three buttons. These buttons are used to perform different task.

b) THE TRACKBALL

Track Ball is pointing devices most often used in the place of the mouse. A trackball is a stationary (motionless) device related to the mouse. It has a ball on the top and you can roll the ball directly with your hand. The trackball is used in laptop computer. There is no need of mouse pad for track ball.

c) POINTING STICK

Pointing stick is a pressure-sensitive device. It is similar to a pencil eraser and exists between keys on the keyboard. The pointer on the screen moves when the user pushes the pointing stick.

TOUCH SENSITIVE SCREENS

Touch screen is a video display screen that receives input from the touch of finger. The screen is covered with a plastic layer. There are invisible beam of infrared light behind the screen. The user enters data by touching icons or menus on the screen. Most touch screen computer use sensor to detect touch of a finger.

PEN-BASED COMPUTING (LIGHT PEN)

The pen-based devices use photoelectric circuitry to enter data into the computer through a video screen. A user can write on the video display, the light-sensitive pen sends information to the computer when user touches the pen on certain areas of a specially designed screen. Light pen is usually used by engineer, graphic designer, and illustrator.

VOICE RECOGNITION AND RESPONSE

Voice recognition device is used to directly convert spoken data into electronic form into a computer system. Voices recognition and voice response is the easiest method for data entry and conversational. The microphone is attached to the computer with the help of sound card. The capability of a computer to distinguish spoken words is called voice recognition or speech recognition. Voice input is faster way of entering data. Many word processing applications provide the facility of voice input. The user speaks in microphone and the application software writes the spoken words as a text. Speech microprocessors can be found in toys, calculators, appliances, automobiles, and a variety of other consumer, commercial, and industrial products.

OPTICAL AND MAGNETIC RECOGNITION

Optical character recognition equipment can read special-purpose characters and codes. Thus optical scanning provides a method of direct input of data from sources documents into a computer system.

1- Optical Scanning

An optical reader is a device that uses a light source to read character, marks, and codes. It then converts them into digital data that can be processed by computer.

OCR-based optical scanning systems are used extensively in the credit/debit card billing operations of credit/debit card companies. OCR devices are expensive. e.g SCANNER, Magnetic Data entry (MICR)

a) SCANNER

Scanner is Optical character recognition equipment that can read special-purpose characters and codes. Scanner provides a method of direct input of data from sources documents into a computer system. There are many type of optical reader, but they all use photoelectric devices to scan the characters being read. Reflected light pattern of the data are converted into electronic impulses, which are then accepted as input into the computer system. OCR-based optical scanning systems are used extensively in the credit card billing operations of credit card companies, bank, and oil companies.

b) MAGNETIC DATA ENTRY

Magnetic-ink character recognition reader is used to read text printed with magnetized ink. It is used by bank industry for check processing. Each check contains MICR characters at the lower-left edge. These characters represent check number, bank number and account number.

Another familiar form of magnetic data entry is the magnetic stripe technology that helps computer read credit cards. The dark magnetic stripe on the back of credit and debit cards is the same iron oxide coating as on magnetic tape. Customer account number can be recorded on the stripe so it can be read by bank ATMs, credit card authorization terminals, and other magnetic strip reader.

MICROPHONE

It is an input device that is used for the input of voice in place of using the keyboard and mouse. Special software is used to convert voice into text. This requires fast processing and a lot of memory and will become more common as the technology improves. The microphone converts audio signals into digital form.

VIDEO CAMERAS

Video cameras are an input device that is able to capture images of any type data. Most scanners incorporate a special sort of camera made up of Charged-Coupled Devices (CCDs). Each CCD receives light from the image and the light generates an electrical charge. This means that light areas or dots of the image are represented by charged cells and dark areas by uncharged cells.

DIGITAL CAMERA. Digital Camera is used to take and store picture in digital form. It does not use traditional camera film. It save money and the photos can be customizing using different application software.

Digital Camera store image using different techniques like floppy disk, SuperDisk, PC Card, Compact flash card, memory stick, mini-CD and micro drive. Digital camera can be connected to a computer easily through USB port.

OUTPUT DEVICES

The device through which the process information comes to outside world is called output devices. An output device can be used to store, display or print the information. (e.g. monitor, printer, plotter, speaker etc)

MONITORS:

A TV-like device that is used by the Computer for displaying the information to the outside world is known as CRT or VDU or more simply a Computer Screen. The Computer generates text and/or graphs on the Screen using two components called the Monitor and the Video Adopter Card. The Monitor mainly consists of glass cone, which uses special electron guns to hit the Screen from back towards the cone and thus producing text or graphs with various colors. The Monitor is used how to control the coming rays and the Video Adopter card is used what to display i.e. either text or pictures. Monitors/Screens can be selected on the basis of user requirements. There are different types of Monitors are the following.

MONOCHROME MONITOR:

Monochrome means one color. Monochrome monitors display images in a single color usually white, blue, red or amber. Normally Monochrome is any Monitor that can not display colors. They can be black and white type but they are often available in green colors because green color is easier to eyes. A Monochrome Monitor usually cannot display graphics. But later on some techniques were developed to have the graphics capability in the Monitors,

COLOR MONITOR:

Color monitor display output in different color. Graphics, picture and colorful images are best viewed in color monitor.

FLAT PANEL MONITORS:

Laptop PCs use flat-panel monitors. These monitors take less space. Flat panel monitor use a variety of technologies. The most common is LCD (Liquid Crystal Display). LCD monitor use much less power than manual monitor.

LCD monitors creates images with a special type of liquid crystal that is normally transparent but becomes solid when charged with electricity.

PRINTERS

Printer is an output device that prints character, symbols, and graphics on paper. The printed output is called hard copy. Print resolution is commonly measured in dots per inch (dpi). There are many types of Printers varying in speed and quality. Different types of printers as follows. 1-Impact 2-Non-impact

1- IMPACT PRINTER

Impact printer works like a typewriter. It prints character or images by striking a print hammer or wheel against an inked ribbon. Impact printers are the following

a) DOT-MATRIX PRINTER

Dot Matrix printer produces printed images when tiny pins on a print head strikes an inked ribbon. When the ribbon presses against the paper, it creates dots that form characters and graphics. The dot matrix printer head contain nine to 24 pins. This number of pins depends on the manufacture and printer model. A higher number of pins print more dots that produce higher quality. Cheaper dot matrix printer uses 100 to 150 DPI. Their speed is from 200 to 300 characters per minute. The expensive printer use 300 DPI and a speed of 3000 to 1000 character per minute.

b) DAISY-WHEEL PRINTERS

Daisy wheel is similar to type writer. They produce rather excellent letter-quality printout as compared the dot-matrix printer. They work just like the typewriter and use a hammer and a wheel to print something on paper. But they are very much noisy and hence are not so popular.

2- NON-IMPACT PRINTER

Non-impact printer produces character without striking devices on paper. They are much quieter than impact printer. The following are the non-impact printer.

a. LASER PRINTERS

The most expansive and quality bearer printers are the Laser printers, which produce high-quality printout and are used for desktop publishing and graphics. A Laser printer works on the principles of a Photocopier. Simply a metal drum called TONER is filled with special ink which, just sprinkle ink onto the paper and thus prints the character. They are very fast and use multiple fonts for text and graphics.
Besides them now there are color printers available in dot matrix as well as Laser printers and all others as well.

b- INK-JET

It prints character and graphics by spraying tiny drops of liquid ink on paper. These printers can produce text and graphics in both black-and-white and color. Inkjet printer is slower than laser printers. They can print 1 to 6 pages per minute. Its print quality is higher than dot matrix printer. Most inkjet printer has usually two print cartridges: one containing black ink and other containing color.

PLOTTERS

A plotter is an output device that is used to produce image-quality graphics in a variety of colors. Plotters works by drawing lines on paper using pens held in a mechanical arm. They are mostly used for Engineering and Maps drawing purposes.
cuit can be fixed on a large-scale integrated (LSI) silicon chips.
There are two type of semiconductor memory.

SPEAKER and HEADSET

Speaker is an output device that produces audio output. These devices produce music, speech, or other sounds like beep etc. Speaker and Headsets are two commonly used audio output devices. It produces softcopy output. We use speaker to hear any type of sound.

CHAPTER-4

(STORAGE DEVICES)

Main or Primary Memory or Internal Memory

The Main memory (Primary Memory) of CPU is the place where the computer program and data are stored during processing. This storage unit is often called either main storage or internal storage or primary storage.

There is usually two types primary storage.

a) RAM:

It stands for Random-Access-Memory or read/write Memory because information can either be read from or written to the RAM. This is the memory whose information can be erased or changed. It is temporary memory. Any thing stored in RAM is lost when computer is switched off.

b) ROM:

It stands for Read-Only-Memory. Information can be read from ROM but we can't write information to it. This is the memory whose information cannot be changed. The information stored in it can't be lost if we turn off the Computer. ROM is used to store permanent program. This information is available on small pieces of the memory called chips.

Secondary or Auxiliary or External Memory (Storage)

The devices of a computer that store information such as software and data permanently are called secondary storage. Disk is a secondary storage device where we can store a large amount of data and from where it can be retrieved. It has different types e.g. Hard Disk, Floppy Disk, CD-ROM, Magnetic Tape, Magnetic Drum

Q) DISCUSS THE FOLLOWING STORAGE DEVICES.

a) SEMICONDUCTOR PRIMARY MEMORY STORAGE DEVICES

The primary storage (main memory) of computers consists of microelectronic semiconductor memory circuit. Million of storage cir

i. RAM ii. ROM (already discuss)

Advantage

Some major attractions of semiconductor memory are small size, great speed, shock and temperature resistance, and low cost due to mass production capabilities.

Disadvantage

Most semiconductor memory is volatile, which lost their contents when electric power is off.

b) SEMICONDUCTOR SECONDARY STORAGE DEVICES

Semiconductor memory chips are being used as direct access primary and secondary storage media for both large and small computers. Plug in memory circuit boards containing up to several megabytes of semiconductor memory chips (RAM cards) can be added to a microcomputer to increase its capacity. This provides a very-high-speed semiconductor secondary-storage capability, sometimes called a RAM disk.

Semiconductor secondary storage devices also include removable credit-card-size "flash memory" RAM card. Flash memory is nonvolatile memory chip. So there was a need to store the memory permanently. So flash memory is made to store memory on permanent basis. Flash chips are currently used in cellular phones, cockpit recorder and flash drive in computer. Now a day flash drive is common secondary storage device, which is mostly using for moving data and program.

c) Other Secondary Storage Devices are the following

MAGNETIC STORAGE DEVICES

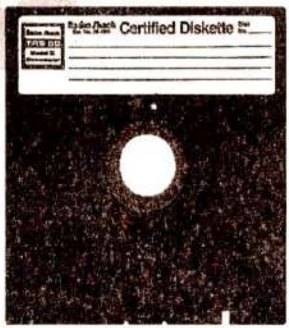
Magnetic storage is the most common form of secondary storage for modern computer system. They provide fast access and high storage capacity at a reasonable cost.
It has different types e.g. Magnetic Disk, Magnetic Tape, Magnetic Drum, and CD-ROMs.

1-FLOPPY DISK

It is a removable Disk i.e. it is not fixed in the computer. It has less storage capacity than a hard Disk. To use a floppy Disk you must have a floppy Disk drive. Letter used for floppy Disk drives are A & B.

Size	Density	Capacity
5.25"	Double	360 Kilobytes
5.25 "	High	1.22 Megabytes
3.5 "	Double	720 Kilobytes
3.5 "	High	1.44Megabytes

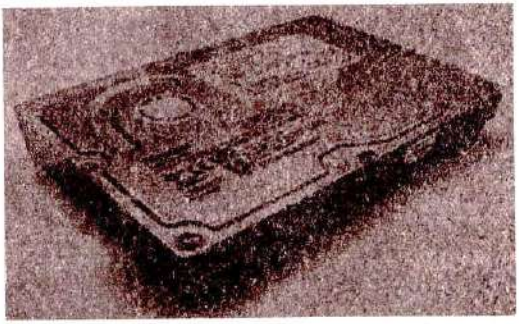
Floppy Disk 3.5"



Floppy Disk 5.25"

2-HARD DISK

It is storage device. It circular metallic platter to allow data storage, both sides of each platter are coated with a magnetic material that is iron oxide.
The circular plate is thick in size and permanently sealed in completely enclosed or an airtight case to prevent from dust and other damages. This is also called fixed disk and use for more storage that is it can store a huge amount of data and faster access speeds than floppy diskettes. Its advantage is fast processing speed and to store large amount of data.



3-MAGNETIC TAPE STORAGE.

Magnetic tape is widely used secondary storage medium record data on one side of the tape. Data is recorded in the form of magnetize spot on the plastic tape coated with magnetic material iron oxide by the read/write head of magnetic tape drivers. Magnetic tape is a flexible plastic tape. Magnetic is usually subdivided into horizontal track to accommodate recording bits into common computer codes. Blanks spaces, known as gapes, are used to separate individual data record and blocks of grouped records. Most devices group record into block to conserve storage space instead of leaving gaps between each record. It is used when large amount of data are to be processed sequentially. An advantage of magnetic tape is that it is very cheap and economical storage medium but very slow in processing.

OPTICAL DISK STORAGE DEVICE

Optical Disk uses laser technology to read and write data. The LASER stands for Light Amplification through Stimulated Emission of Radiation. Laser beam writes on the surface by creating small pits (hole) in the disk.

Optical disk reads data by focusing laser beam on the surface of the disk. A laser detects the presence of pit. The presence of pit indicates 1 and absence of pit indicates 0. Laser beam converts these pits into digital data. Optical disk storage capacity is from 600 MB to over 1 Gb The optical disk storage is much safer than magnetic media. There are different type of optical storage are available.

1- CD-ROM stand for compact disk read only memory. The data stored on CD-ROM can only be read. It cannot be deleted or changed. CD-ROM is portable storage device. The data can be transfer easily by using CD-ROM. It can store about 650 MB of data or above.

Advantages of CD-Rom

CD-ROM is the least expensive way to store large amount of data and information.

CD-ROM disk are durable and easy to handle information can be store on CD-ROM for many years.

Disadvantages

The data can not be edited

It retrieves data and information more slowly than magnetic disk

2- DIGITAL VIDEO DISK (DVD)

DVD stands for Digital Video Disk. It is similar to CD-ROM. It uses a laser beam with short wave length. The short wave length reads smaller holes on the disk.

Data storage capacity of the disk is increased if the holes size is small. So the storage capacity of DVD ROM is much greater than CD-ROM. It can store up to 17 GB of data.

3-WORM DISKS

WORM stand for Write Once Read Many. It can only be read and cannot be updated or changed. It can store greater volumes of information than CD-ROM. Its capacity is 200 GB or above.

4-REWRITABLE OPTICAL DISKS

CD-RW provides full rewritable capabilities. This technology record and erases data by using a laser to heat a microscopic point of the disk surface. A 5 ½ inch rewritable disk can store up to 5 GB.

PC CARDS

Pc card is a thin credit card size device. It is used to add memory, disk drives, sound, fax/modem, communications and other capabilities to a mobile computer like laptop. All Pc Cards follow the standard developed by PCMCIA. It stands for Personal Computer Memory Card International Association. PC Card can be attached to the computer without opening the system unit and restarting the computer. The operating System automatically detects the PC Card as it is attached to the system.

SMART CARDS

Smart card is similar to credit card or ATM card. It stores data on a thin microprocessor that is embedded in the card. The card is inserted into a specialized card reader to read and update its contents.

CHAPTER-5

5

(Introduction to Software Design and algorithm)

SOFTWARE

Software is a set of instruction that tells a computer what to do. Software is a written computer program or a series of instructions. Software is program that allows the hardware to perform a useful work. Without software hardware is quite useless. Software is the communication between user and computer. Software is needed to complete the input, processing, output, and storage and control activity of Information System. There are two type of Soft ware

1) System software 2) Application Soft ware.(Over view of soft ware)

1-SYSTEM SOFTWARE

System Software is a group of program that controls all the operation of computer. It controls the usage and allocation of different hardware components. It enables other application program to execute properly. System Software consists of programs that manage and support a computer system and its information processing activities. System software is the type of software, which makes better & effective utilization of the entire computer System. It controls all the operations of computer system. System Software serves as interface between systems, network, hardware and the application programs of end users. The manufacturers provide it. The person preparing system software is called System Programmer & the process is called System Programming. The development of Compiler, Operating System, and High-Level Languages come under this category. For example, Operating System, utilities, device drivers and Network Management Programs.

There are three types of System Software

1:-System Management programs 2: System Support program 3:-System development programs.

a-System Management Programs

It manages the hardware, software, networks and data resources of a computer system during its operation. Examples of system management programs are operating system, network management program, monitor performance program, database management program.

b-System Support Program:

Program that supports the operations and management of computer system by providing a variety of support services. For example system utilities and security monitors program.

c-System Development Program:

Program that helps users in developing programs and procedures and prepare users programs for computer processing. For example language translator, programming editor, debuggers, code generator and CASE tools.

2-Application Software

Application Software is a type of software that is used to perform specific task for users. It is used to perform different task such as word processor, a spreadsheet or database etc. An application is the job or task a user wants the computer to do. Application software enables you to perform specific task, solve problem, and perform work.

The person preparing application software is called application programmer. For example software developed for the PAYROLL of employees and program for maintain of personal record come under this category.
There are two type of application Software
1-General Purpose Program
2- Application Specific Program

1-General Purpose Program

General-Purpose application programs are programs that perform common information processing jobs for end user. General Purpose software has enough features to accomplish a wide variety of task. For example, word processing programs, spreadsheet programs, database management programs (Ms-Access, Oracle), and graphics programs are popular with microcomputer users for home, education, business, and scientific etc.

2- Application Specific Program/Special purpose program

Specific Application Program support specific application of end users. Specific software performs a specific task and cannot be changed or programmed to perform a different task..
Some major categories are
Business application program are program that are develop for important business functions or industry requirements. For example program for accounting, marketing, finance, and employee etc.
Scientific application programs are program that are develop for scientific and engineering purpose. For example program for scientific analysis, engineering design, and monitor of experiment.
Other application programs are other than business and scientific. For example computer application in education, entertainment, music, art, law, and medicine, video-game program, entertainment program, etc.

PROGRAM TOOLS:

Following are the programming tools for the programmer with the help of which the programmer can write a perfect program. These are

1- Algorithm 2- Flow Chart

ALGORITHM

An algorithm is a finite set of instructions, which accomplishes a particular task.
An algorithm is a finite step-by-step list of well-defined instructions for solving a particular problem.

ALGORITHM NOTATION

The algorithm is a base of not only effective data structure but it is also the base of good programming. Therefore, it is necessary that each algorithm should be written clearly. A complete algorithmic notation is given below.
1) Name of algorithm:
Every algorithm is given a name, written in capital letters.
Introductory Comments.
The algorithm name is followed by a brief description of the tasks the algorithm performs.

This description gives the name and types of variables used in the algorithm.

Steps:

The algorithm is made of a sequence of numbered steps. Each beginning with a phrase enclosed in square brackets which gives an abbreviated description of that step. Following this phrase is an ordered sequence of statements which describe the actions to be executed or tasks to be performed.

Comments:

An algorithm step may terminate with a comment enclosed in round parenthesis, which is used to help the reader better understand that step. Comments specify no action and are enclosed only for clarity.

Example of an algorithm:

Algorithm GRADES(M1,M2, M3,M4,Average)

This algorithm reads four marks denoted by M1, M2, M3, M4 and compute the average grade. All variables are assumed to be real

(1)	[Input individual marks]	Read (Ml,M2,M3,M4)
2)	[Compute average grade]	Average= (M 1+M2+M3+M4)/4
3)	[Output Result]	Write ("Final grade is" , average)
(4)	[Finish]	Exit

FLOW CHART

Charting:

Charting is a graphical or pictorial means of presenting data. Charting takes the flow of work and makes a picture of it. Charts can be used to illustrate statistical data, locations of desks or equipment, relationships between people and jobs, sequences of events, work flow, organizational structure and planning or implementation schedules.

The primary use of charting is for communication and documentation of the system. Charting is also used during feasibility studies, problems definition understanding the existing system, defining new systems requirements, design, cost comparisons, final report, and implementation.

For example Flow chart, Bubble chart or data flow diagram, Grind chart etc.

Flow charts

A flowchart is a pictorial/graphical presentation of flow of data to solving the problem. A flowchart is a diagrammatic representation of the logic or sequence of steps that solve a problem. Flowchart is tools for the programmer to analyze, organize, and solve a problem. A number of pictorial figures are used to help draw the flow charts. Finally the instructions are coded in one of the programming languages, called a program. The person who writes program are called programmer.

When developing a flow chart the systems analyst (or programmer) should observe the following guidelines:

Flow charts are drawn from the top of a page to the bottom and from left to right.

The activity being flow-charted should be carefully defined and this definition made clear to the reader. Where the activity starts and where it end, should be determined.

Each step of the activity should be describes one-verb descriptions, e.g. prepare statement or file customer statement.

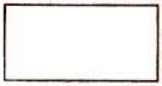
Each step of the activity should keep in its proper sequence.
The scope or range of the activity being flowcharted should be carefully observed. Any branches that leave the activity being charted should not be drawn on that flow chart. A connection symbol should be used and that branched put on separate pages or omitted entirely if it does not pertain to the system.
Use the standard flow-charting symbols.

Type of flowcharts:

The most important types of flowcharts are:
System flowchart, Program flowchart

System Flowchart

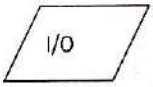
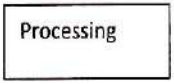
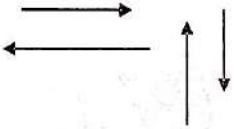
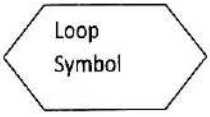
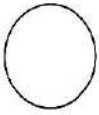
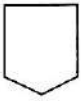
A system flow chart show the overall work flow of the system. It is a pictorial description of the sequence of the combined procedures that makes up the system. A system flowchart shows the sequence of physical devices used to solve that problem.
System flowchart symbol

Description	Symbols
Input/ output symbol	
Processing symbol	

Program Flowchart

This is the pictorial representation of the logic of the program, showing different steps to solve a problem.

Program flowchart symbols

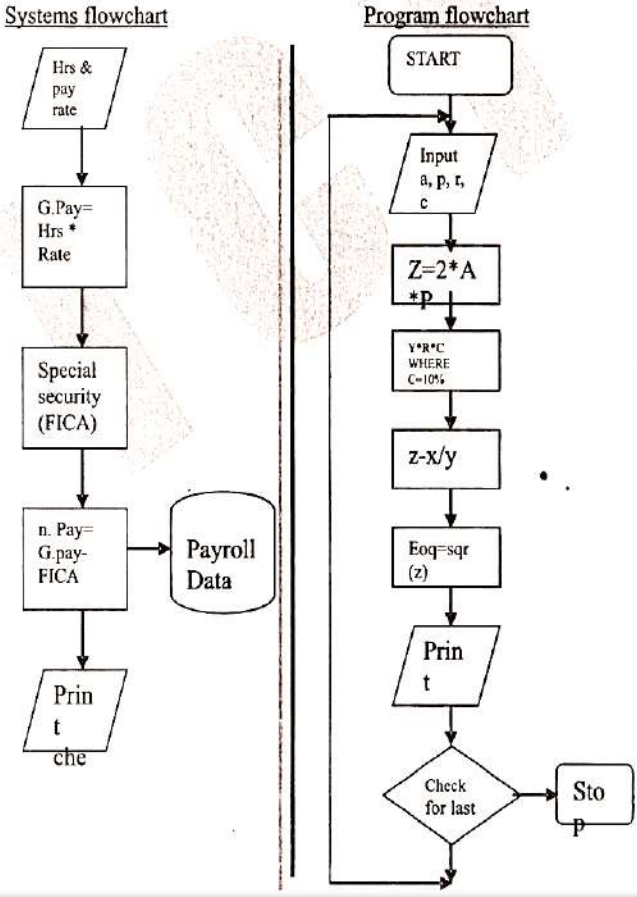
Description	Symbols
Start/Stop	
Input/ output symbol	
Processing symbol	
Flow lines	
Decision Symbol	
Loop Symbol	
On page connector	
Off page connector	
Pre-defined process	

Example

The XYZ Company has found that it can purchase a raw material at a cost of $40.00 per order. The company has a 10% carrying charge on average inventory. They expect to use $20,000 of the raw material within the next year. To determine the economic order quantity (EOQ) by using the formula: EOQ = 2AP/RC Where: A=Annual Cost P=Annual Usage R=Price per order C= Carriage Charges

Draw its system Flowchart and program flowchart.

Two very simple program flowcharts are shown in below figure. The one on the left is program flow chart prepared by a systems analyst to show the detail of procedural operation. The one on ht eight is a programmer to show details of computer program operation. It is noted that the systems analyst into a program flowchart as in below left side figures further expands the systems flowchart in above example. Programmer when expands the detail into program flowchart shown in the below



CHAPTER-6

(PRODUCTIVE ENHANCEMENT SOFTWARE PACKAGES)

Q) What are WORD PROCESSING PACKAGES?

A Word processing program is used to produce letters, applications and other documents. Word processing is used in business to generate different documents.

Word Processing package provide tool bar which, display shortcut button to make editing. This packages provide word wrap, justification function. In word processing packages we can bold, underline the text. Text can be inserted or deleted. Block-editing tools can be used to move a block of text from one point to another point. Program search function can be used to find user specified word. Default format values are often supplied by the package, but they are easily changed. A word processing package may also include a spelling checker, thesaurus and mail merge.

Word processing packages are Ms-Word, Lotus WordPro, Word Star, Word Pad and Word Perfect These packages can convert all documents to HTML format for publication as Web pages. End-users and organization can use desktop publishing (DTP) software to produce their own printed material that looks professionally published. That is they can design and print their own newsletters, brochures, manuals, and book with several styles, graphics, photo, and colors on each page. Word processing packages and desktop publishing packages like Adobe PageMaker is used to do desktop publishing.

DIFFERENCE BETWEEN MANUAL AND ELECTRONIC WORD PROCESSING

MANUAL WORD PROCESSING	ELECTRONIC WORD PROCESSING
TYPEWRITER IS USED IN MANUAL word processing	Computer is used in electronic word processing
Text once write cannot be change.	Text can be change.
Text cannot be formatted	Text cannot be formatted
Word wrap function is not available	Word wrap function is available
Text cannot be deleted or inserted	Text can be inserted or deleted.
Text cannot be moved from one location to another location.	We can move text from one location to another
Word cannot find or replace a word	Word can be find or replace
Spell check function is not available	Spell check function is available.
Text cannot store text	We can store text.

Component of Computer based spread sheet.
Following are the components
1- A micro processor computer with sufficient RAM in primary memory storage.
2- Spread sheet software (Ms-Excel)
3- Secondary storage devices like Hard disk, CD-ROM etc.
4- Printer

Q) WHAT IS ELECTRONIC SPREADSHEETS?
Ans:- Electronic spreadsheet software are application program used for calculation. Think of them is multipurpose calculator. Electronic spreadsheet is used for mathematical, statistical, scientific, graphics, tabulation, database and accounting purpose. It consists of row and column. For example Lotus 1-2-3, Microsoft Excel, and Quattro Pro.

Difference between Manual and Electronic (Computer) Spreadsheet

Electronic (Computer Spreadsheet) are far better than manual Spreadsheet in all most all aspect. We will discuss only some of the benefits of using a Electronic spreadsheet
Electronic spreadsheets work thousand of times faster than the manual spreadsheet. Your work in an electronic spreadsheet is better, faster and precise than manual spreadsheet.
In the manual spreadsheet, if you find an error after making it, you have to erase it or you will have to make the whole worksheet again.
Whereas in electronic worksheet, you can check and correct your worksheet before printing.

You can copy the formula once you made to all other amounts in the worksheet, while in the manual worksheet you are to calculate the formula for every amount.
You can make your worksheet more beautiful and smart by adding charts and graphical objects, while the manual worksheet is a dumb-looking piece of white paper. No charm, no glamour.

The electronic worksheet is much bigger than the manual worksheet.
Saving your worksheets a big problem you can have with the manual work. Every time you make a worksheet for one purpose, you are to save it in a different file. Also you are to store the previous worksheets to keep track of what going on. In the electronic work, you can save them on your disk, which saves the loss of paper and you can move many worksheets on one floppy disk in your pocket. Other way, you would have to pick a bundle of papers with you.

Other benefits contain the tools for spell-checking, built-in formula list, different fonts and sizes, automatic alignment, copying and pasting, linking and many more which are difficult to be listed here. However, once you get started with a electronic worksheet, it looks damn difficult to go back to the manual method.

Q) WHAT IS DATABASE MANAGEMENT PACKAGE.?

Ans: A set of computer programs that control the creation maintenance and utilization of the databases of an organization". The DBMS provides concurrent access to multiple database users and the DBMS must be able to recover and restored a damage database from backup copies.

Database Management software manage and supports the maintenance and retrieval of data store in data base e.g. Ms-Access, Dbase, and Oracle allow you to setup and manage database on your PC, network server, or the World Wide Web.

Databases management packages perform four tasks.

Database development. Define and organize the content, relationships, and structure of the data needed to build a database.

Database interrogation. Access the data in database to display information in a variety of formats. End users can selectively retrieve and display information and produce forms, reports.

Database maintenance. Add, delete, update, and correct the data in a database,

Application development. Develop prototypes of data entry screen, Web pages, queries, forms, reports, and labels for a proposed business application. Or use a built-in 4GL or application generator to program the application.

CHAPTER-7

(Introduction of Number System and their Conversion)

Number systems:

The set of symbols to denote a numerical quantity or figure is called number system. In general a number "N" of a number system is defined as the sum of the terms, where a term is defined by a symbol (digit) multiplied by its base raise to some power. For example,

$N = \ldots x_3 b^3 + x_2 b^2 + x_1 b^1 + x_0 b^0 + x_{-1} b^{-1} + x_{-2} b^{-2} + \ldots$

The number system varies according to their names, characteristics and utilization. Following are the four commonly used number systems:

Decimal Number System. 2. Binary Number

Octal Number 4. Hexadecimal Number

1. Decimal Number System

A number system which has a base (radix) 10 and uses symbols (digits) 0, 1, 2, 3, 4, 5, 6, 7, 8, 9 is called a Decimal number system. For example.

The general rule for representing decimal number system using positional notation.

$a_{n-1}10^{n-1} + a_{n-2}10^{n-2} + a_{n-3}10^{n-3} + a_{n-1}10^{n-1} \ldots\ldots + a_0 10^0 + a_{-1}10^{-1} + a_{-2}10^{-2} + a_{-3}10^{-3} + \ldots + a_{-n}10^{-n}$

$(125)_{10} = 1x10^2 + 2x10^1 + 5x10^0 = 00 + 20 + 5 = 125$

$(0.532)_{10} = 5x10_{-1} + 3x_{-2} + 2x10_{-3} = 5/10 + 3/100 + 2/1000 = .0.532$

$(125.532)_{10} = 1x10^2 + 2x10^1 + 5x10^0 + 5x10^{-1} + 3x10^{-2} + 2x10^{-3} = 00 + 20 + 5 + 5/10 + 3/100 + 2/1000$

$= (125.532)_{10}$

2. Binary Number System

A number system which has a base 2 and uses symbols 0 and 1 is called binary number system.. The computers use the binary number system because computer internal circuitry has two states on and off and the binary number system has also two digits 0 and 1. 1 for on and 0 for off.

$(101)_2 = 1x2^2 + 0x2^1 + 1x2^0 = 4 + 2 + 1 = 5$

$(0.101)_2 = 1x2^{-1} + 0x2^{-2} + 1x2^{-3} = ½ + 0 + 1/8 = 5/8$

3. Octal Number System

A number system which has a base 8 and uses symbols 0,1,2,3,4,5,6,7 is called Octal Number system. For example.

$(25.32)_8 = 2x8^1 + 5x8^0 + 3x8^{-1} + 2x8^{-2} = 16 + 5 + 3/8 + 2/64 = 21.40625$

4. Hexadecimal Number System

A number system which has a base 16 and uses symbols 0,1,2,3,4,5,6,7,8,9,A,B,C,D,E,F. For example.

$(1A2)_{16} = 1x16^2 + Ax16^1 + 2x16^0 = 256 + 160 + 2 = 418$

For the fractional part the method is the same as in decimal number system.

$(2B1.23)_{16} = 2x16^2 + Bx16^1 + 1x16^0 + 2x16^{-1} + 3x16^{-2}$

CONVERSION FROM ONE NUMBER SYSTEM TO ANOTHER:

The process of interchanging a number in one base system to another and vice-versa is called conversion of Number system. We discuss the following conversions.

Decimal Conversion to Binary and vice versa

While converting a number from decimal form to binary form divide the number by 2 and to convert from binary to decimal we have a method called positional notation method. It means expand the number in base 2. It can be explained with the help of the following example.

$(25)_{10}=(11001)_2$

25	
2	12------1
2	6------0
2	3------0
	1------1

$(11001)_2 = 1x2^4+1x2^3+0x2^2+0x2^1+1x2^0 = 16+8+0+0+1 = 25$

$(1100.01)_2 = 1x2^3+1x2^2+0x2^1+0x2^0+0x2^{-1}+1x2^{-2} = 8+4+0+0+0+¼ =$ 49/4 = 12.25

Now to convert back the same number into binary form we have another method called Division method. It means divide the whole number 12 by 2 and multiply the fractional part by 2 (until the fractional part becomes 0 or up to 3 or 4 times) as shown below.

	12		.25
			X2
2	6-----0		
			0.5
2	3-----0		x2
	1-----1		1.00

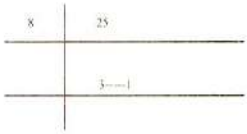
Hence the resultant number is $(1100.01)_2$

Conversion from Decimal to Octal and vice versa

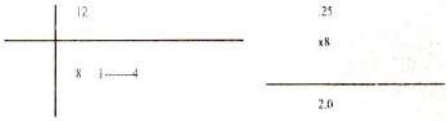
To convert decimal number system into any other number system divides the decimal number by the base of that number system. To covert any number system back to decimal number system expand that number system using positional notation.

While converting a number from decimal number system to Octal number system divides the number by 8 and to convert from Octal to decimal expand in base 8 using positional notation. It can be explained with the help of the following example.

$(25)_{10}=(\ ?\ )_8$



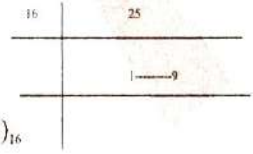
Result $(31)_8$
Convert $(31)_8 = (\ ?\ )_{10}$
$= 3x8^1 + 1x8^0 = 3x8+1x1 = 24+1 = 25$
Result $(25)_{10}$
Another example
$(12.25)_{10} = (\ ?\ )_8$



Hence the resultant number is $(14.2)_8$
Vice Versa
Convert $(14.2)_8 = (\ ?\ )_{10}$
$(14.2)_8 = 1x8^1 + 4x8^0 + 2x8^{-1} = 1x8+4x1+2x1/8 = 8+4+2/8$
$= 12+1/4 = 12+.25 = 12.25$

Conversion from Decimal to Hexa-Decimal and vice versa

While converting a number from decimal number system to Hexa-Decimal number system divides the number by 16 and to convert from Hexa-Decimal to decimal expand in base 16 using positional notation. It can be explained with the help of the following example.
$(25)_{10} = (\ ?\ )_{16}$



Result $(19)_{16}$
Vice Versa
Convert $(19)_{16} = (\ ?\ )_{10}$
$(19)_{16} = 1x16^1 + 9x16^0 = 1x16+9x1 = 16+9=25$ = Result $(25)_{10}$
Another example $(12.25)_{10} = (\ ?\ )_{16}$

12 is not divisible by 16 So 12 is equal to C
Hence the resultant number is $(C.4)_{16}$
Vice Versa
Convert $(C.4)_{16} = (\ ?\ )_{10}$
$(C.4)_{16} = Cx16^0 + 4x16^{-1} = 12x1+4x1/16 = 12+4/16 = 12+1/4 = 12+.25 = 12.25$

Table for conversion

Decimal	Hexa	Octal	A	B	C	D
0	0	0	0	0	0	0
1	1	1	0	0	0	1
2	2	2	0	0	1	0
3	3	3	0	0	1	1
4	4	4	0	1	0	0
5	5	5	0	1	0	1
6	6	6	0	1	1	0
7	7	7	0	1	1	1
8	8		1	0	0	0
9	9		1	0	0	1
10	A		1	0	1	0
11	B		1	0	1	1
12	C		1	1	0	0
13	D		1	1	0	1
14	E		1	1	1	0
15	F		1	1	1	1

We can convert a binary number to octal number by taking the binary digits in group pairs of three bits to make an octal digit according to $8 = 2^3$ the power of 2 is 3 so make pair of 3 binary digit. For example.

$(1001.11)_2 = 001\ \ 001\ .\ 110 = (11.6)_8$

Note : For making pairs in binary form, it must be from right to left for the integer potion and from left to right for fractional portion. Also note that before period (.) we can put leading 0's and after period we can put trailing 0's. Now conversion from octal to binary is simply to reverse the binary to octal process. For example

$(11.6)_8 = (001\ 001.110)_2$

1 1 6

$(35.125)_8 = (011\ 101.001\ 010\ 101)_2 = ($

3 5 1 2 5

Ans is $11101.001010101)_2$

Conversion from Binary to Hexadecimal and vice Versa:-

We can convert a binary number to octal number by taking the binary digits in group pairs of four bits to make an Hexa-decimal number according to $16 = 2^4$ the power of 2 is 4 so make pair of 4 binary digit. For example

$(1001.11)_2 = 1001.\ 1100 = (9.C)_{16}$

9 C(12)

Note : For making pairs in binary form, it must be from right to left for the integer potion and from left to right for fractional portion. Also note that before period (.) we can put leading 0's and after period we can put trailing 0's. Now conversion from Decimal to binary is simply to reverse the binary to Decimal process. For example

$(9.C)_{16} = (1001.1100)_2$

9 C(12)

$(35.125)_{16} = (0011\ 0101.0001\ 0010\ \ 0101)_2 =$

3 5 1 2 5

Ans is $(110101.000100100101)_2$

$(15.62)_{16} = (0001\ 0101.\ 0110\ \ 0010)_2$

1 5 6 2

$(10000111.1101)_2 = 1000\ \ 0111.1101 = (87.D)_{16}$

8 7 . D (13)

Octal to Hexadecimal Conversion and Vice Versa:-

We have no direct method for this conversion, but using any number system (binary for example) as intermediate indirect conversion, we can easily perform this conversion.

$(11.6)_8 = (\ ?\ )_{16}$

Conversion into binary from octal by making three bits, we have

$(11.\ 6)_8 = (001\ \ 001.110)_2 = (1001.11)_2$

Conversion into Hexadecimal by making four bits, we have

$(1001.11)_2 = (9.C)_{16}$ where C = 12

Hexa to Octal

$(9.C)_{16} = (\ ?\ )_8$

$(9.C)_{16} = (1001.1100)_8$

9 C

CHAPTER-8

(IMPACT OF COMPUTER ON SOCIETY)

The Computer and Society:- Computers increasingly affect our lives in many ways , which benefit individual and society as a whole. In medicine, computerized databases, networks, diagnostic devices, and monitoring systems helps doctors and hospital personnel to save lives. Computers in laboratory speed up the progress of medical research. In education, computer-aided instruction helps students to learn basic skills through practice tutorials and to carry out advanced experiments in natural sciences and the social sciences through computer simulation. In business and in professional offices, computerized databases, and accounting programs, and word-processing programs make administrative and clerical work easier; computer simulations help businesses to run more efficiently and profitably. In science and engineering, computers are used to process large quantities of statistics; furthermore, computer simulation eliminates the need for costly scale models.

Teams of computer scientists are studying the workings of the human brain. One object of this research is to make better artificial replacements of lost human parts; another is to make more intelligent computers and more capable robots.

In some ways computers are not beneficial for our society. Displacement, or the elimination of jobs by computers and computerized devices, is one of the most pressing problems facing the society today. Another problem is preserving the privacy of confidential information when large data banks are linked by networks.

The trend toward increasing general use of computer networks , a new application of computer technology , has great potential for the transformation of society.

The Social Impact of Computer age:

The Computer is one of the most powerful forces in society today. It is being put to use everywhere, it seems in homes and in organizations of all sizes and no one can doubt that this usage is having a strong impact on the people. But the Computer is the driving force behind the information revolution, and as in any revolution some innocent people may be harmed. Hence there are basically two types of impacts of computers on people:

1-Positive Impacts. 2-Negative Impacts.

1-Positive Impact:- Many people enjoy challenging careers in Computers departments as managers, system designers , programmers, and computer operators. But we all benefit in other ways from computer usage. We benefit as consumers of the goods and services provided by computer-using organizations. And we benefit at home by using personal computers for work and for play.

Employment benefits:-Each day , computers help millions of people to do their jobs more efficiently. But employment benefits certainly are not restricted to managers. Health care researchers and other scientists now use computers to control research into complex problem areas that could not otherwise be studied. Layers use online legal data banks to locate cases in order to serve clients better. And the job duties of some office and factory workers have changed from routine, repetitive operations to more varied and appealing tasks through computer usage. For example, office workers who understand text processing, computing and data communications usually have vital role and are given crucial office functions to perform.

Greater efficiency:- Business have always avoided the wastage of time Therefore computer is such a machine which has increased their efficiency and have reduce their time wastage. In minimum time, we can take a lot of work from it because in business time is money and money is power.

Higher quality products:- Computers may also help to improve the quality of products and services we receive nowadays. For example, Microcomputers installed in cars now provide a more efficient means of controlling the engine's fuel mixture, ignition timing, etc.

Aid to the handicapped:- Microcomputers can control devices that allow severally handicapped persons to feed themselves even though they have no upper limb responses.

Improved Safety:- Computer usage contributes to personal safety in many ways. For example, Computer-controlled antilock bricking systems in aircraft and cars to help in preventing from dangerous.

Better information retrieval:- Most information retrieval tasks obviously do not involve life-or-death decisions, but quick computer assisted retrieval saves time of people.

Entertainment and hobby benefits:- A computer can entertain people with hundreds of challenging games. And computer users can compose , paint pictures, store and maintain stamp and coin collection records, and polish their foreign language skills.

Educational Benefits:- Programs can be educational as well as entertaining . Educators agree that the computer can be a powerful motivating and learning tool. Thousands of educational programs are available in such categories as reading languages, Science, Mathematics, social studies and art and music.

Personal Finance benefits:- A pc can help a person in budgeting and balancing his checkbooks, control his installment purchases, control his home's energy use, and analyze his investments.

[illegible]

In spite of the many benefits of computer age , there are also some potential dangers and problems. Computer usage sometimes produces displacement and unemployment. Unemployment refers to the total number of people, which are out of work. Displacement occurs when technological change eliminates jobs. If displacement workers cannot find similar jobs elsewhere or if they cannot find other work, then there is indeed an increase in unemployment. Another problem is preserving the privacy of confidential information when large data banks are linked by networks, etc.

[illegible]

Not two many years ago, the computer was so inconspicuous that most people were seldom aware of its existence. We knew that similar machines guided missiles and satellites and controlled space flights. We knew they sent out our bank statements and calculated our payments. They made our airline reservations, and they saw to it that our plane did not collide with another. We knew there were tiny special-purpose computers in our pocket calculators, and our digital watches. Things are different now. Suddenly we are all aware of the computer as a force in our lives. We are in the midst of the computer revolution; we live in the computer age.

The computer is reshaping our world and will go on reshaping it. The Word computer is not new to us. Today's world is world of computers, we can say that this is IT/computer age because computer are playing a role of growing importance in our lives less than fifty year back there was no computer and no body new about it. Since then, there have rapid change in the computer Technology/IT which continuous to progress computer performs a given complex task in a very short period or does calculation very quickly and accurately. Computer are useful to a wide range of pupils because they can serve many purpose.

Application of computer (USES) Computer in offices

In many offices computer are used for word processing instead of using typewriters. The key punch operator type the letter, report or documents. Once changes are made in the existing documents, store in the computer instead of retyping the whole thing again. The printer can immediately produced as many copies as required.

Computer in the Banks

Banks keep most of the record and data on computer, bank account are maintained on computer to avoid duplication are any chance of error. The cheque are read by MICR (Magnetic ink readers a device used to allow the data on cheque to be read by machine). The number in special character along the bottom of each cheque or printed in Magnetic ink so they can read by MIRC. In this way computer are used the keep track of customer accounts, deposit, withdrawal, loan, interest.

Computer in the Industries

Computer is used to control manufacturing systems and continuous running of the machinery. These are also helpful in monitoring temperature and pressure measurements in the manufacturing process. In many industry computers are used in the form of robot.

Computer in Education

Computer is used in schools in many different ways. They are use to help Montessori children learn different skills such as to distinguish between shapes, colors etc. college students can take advantage of making graphs and charts and do calculations of their mathematical and scientific assignments.

Computer simulation for training

Computer models can be used to train people such as pilots. A working model of an airplane cockpit is built, with a large screen in front of it. On the screen a computer show picture of the view that a pilots would see from a real cockpit.

Computer aided Design

Computer is proved to be an assisting machine or designing tool for engineers, architects and designer to perform their large, and complex job in a very short period.

Example of such designing project of car making, designing, office building, and shaping plaza.

Computer in Health Care

Doctor diagnoses illness by entering patients, symptoms in computer and prescribe medicines accordingly. The doctor mistakes the final decision but the computer speedup the process. It also keeps record of the patients appointment and bills etc.

Computer and law

In law chambers, computers are used to store a data bank of all those cases that have been priory solved or decided. This enables the lawyer to study any case that helps him deal with his current case.

Computer in Police Department

The Police used the computer to help them catch criminals. Data about criminals and suspects can be stored on computer. All the information about a crime can be fed into a computer, which can search through its tore and checks facts.

Computer in the Home

Now day the computer become a necessity of home like other electrical appliances. Children play game on it keeps track of the stamp collections, draw pictures, play music view movies and do some sort of reading and writing according to the needs. Father can write his reports and make calculation while mother can play nutritional meals, make budget etc. they can use computer for electronic male and inter net services.

Word Processing applications: -Word processing or the use of computer as a typewriter is one of the most widely appreciated functions of the modern computers. Anyone who deals in words finds it useful: i.e. secretaries, newspaper reporters, scholars, novelist, and other writers. With a word processor, a user can type out a report, a letter, a story, or whatever is desired, and see it on the computer screen. Revision is easy, Words, phrases, or paragraphs can be inserted or deleted or moved to a different part of the document. The computer can check the spellings, and finally it is copied on the paper using a printer.

Science and Technology: - All of us know that large computers can do millions of engineering calculations per second, can rapidly process the results of hundreds of thousands of experiments in the physics laboratory, and are a crucial too for the modern designer of cars, airplanes and most importantly the microelectronic parts of computers.

In science and technology, the computer is useful not only as a number cruncher but also for its capabilities in the techniques of simulation. Simulation exploits the computer's graphics and numerical capabilities to construct model objects and model worlds. Computer simulation has been especially useful in space exploration. Computer simulation is also useful for weather prediction and earthquake prediction.

MISUSES of computer

Hacking

Hacking is one of the most important disadvantages of Internet. The hackers access the data stored on the computers across the Internet. They can use this data illegally or even destroy it.

Immorality

Internet contains a large number of immoral websites. These websites contains such material that is against the moral values of our society. These websites are damaging character of young people.

Security Problems

Internet has created many security problems. Important data can be hacked on Internet. Hackers also damage different websites and delete their contents. They also retrieve critical data of different organizations and governments.

Viruses

Internet is the most important source of spreading computer viruses. Peoples spread viruses using Internet and emails. Many websites also contain different viruses that are copied to the computers when the users download date from these websites.

Wastage of Time

Many people use Internet without any positive purpose. The young people waste their time in chatting. It affects their performance and makes them inefficient.

Cyber Crime

Internet is a source of many cyber crimes. People use Internet for negative activities. They hacks the credit card numbers of the people and use them for shopping. Some use Internet to spread illegal and immoral material. Many government are introducing laws to stop cyber crimes

Others are

The excessive use of computer damage eye sight.
The people uses computer for playing movies.
Mostly the students and teenage uses it for playing different games.

9

CHAPTER-9

(SPECIAL USES COMPUTER)

History of artificial intelligence:

The term artificial intelligence was first coined in 1956, at Dartmouth conference. The advancement in the field of A.I has been slower than first estimated progress continuous to be made from its birth 4 decades ago.

Q:- What is AI ?

Artificial Intelligence is a group of related technologies that attempt to develop machine to emulate human-like qualities, such as learning, reasoning, communicating, seeing and hearing. The goal of AI is to develop computer that can think, as well as see, hear, walk, talk, and feel. It is an attempt to convert the human information processing into computer-based system. Some scientists claim that development human like intelligence and capabilities (think, reasoning, decision, learning and responding) is not totally possible. But progress cantinas for this ambitions target is going on and only the time tell the truth. Some examples of artificial intelligence technologies are ;

1. Robotics 2. Chess playing machine 3. Expert system etc.

Q) What is CAD/CAM?

CAD (computer aided design):

Computer aided design is the integration of the computer and graphics to aid in the areas of design and drafting. Computer aided design and drafting software are design for mechanical designer and draftsmen, but also for the other fields.

Architectural firms use form of CAD. Use of CAD architecture can draw different design like room plan and different structural model.

Computer aided design, or simply CAD, by definition is the combination of hardware and software components providing the tool of planning and designing and modeling.

History of CAD:

The history of CAD began traced back to 1950. CAD was initially used on mainframe computers in early 1980 AutoDesk revolutionized CAD system by making AutoCAD, which could be run on a PC.

Uses/Application of CAD:

The CAD is used in great number of professional application. This can be a category in three categories.

MCAD (mechanical CAD). Used by engineers to design complex parts of different machines.

AEC (architecture engineering and construction) used for creation of buildings and their system.

GIS (geographical information system) to generate maps from topographic data.

Automobile designer at large auto manufacturing plants use cad to design many prototypes of different cars before creating solid models.

CAM (computer aided manufacturing):

CAM is a form of automation where computers communicate work instructions directly to the manufacturing machinery. Today a single computer can control banks of robotics milling machine, lathes, and welding machine and other tools. The use of computer to control the factory machines in the manufacturing process is called computer aided manufacturing (CAM).

Computer Numerical Control (CNC): - is the system in which operator program computer that control the milling process apparatus. A human does not attend the actual machine. Unlike a human, a compute-controlled difficult tasks. CNC devices make a possible to cut more difficult parts with greater precision. Often a CNC machine a connected to a CAD workstation. By watching the monitor, the CNC operator can view the part as the machine is making it.

ROBOTICS:-

This technology produces computer-based machines which have computer-based intelligence and computer controlled human like capabilities. This area of knowledge produces machine to have touch, power of sight, visual perception and other human like system through the combination of hardware and software. The use of robotics in computer-aided manufacturing.

Most robots are unintelligent; that is, they are programmed to do specific tasks. An unintelligent robot cannot respond to a situation for which it has not been specifically programmed. Intelligence is provided either by a direct link to a compute or by on-board computers that reside in the robot. Most robots are use in factories, spray-painting, and welding. Often these uses are functions that would be tedious or even dangerous for a human to perform. For example, with the help of a TV camera eye, a robot can see components to assemble. It is able to pick them up, rearrange them in the right order. There are some dangerous places inside a nuclear power plant, next to a suspected bomb, at the bottom of the sea, on the floor of a volcano, or in the middle of a chemical spill. But robots readily go to all those places.

Another area of interest is the "personal" robot, familiar to us from science fiction. Scientists believe that in just a few years we'll all have robots in our homes to do practical tasks.

EXPERT SYSTEM

What is Expert System:

A computer-based information system that uses its knowledge about a specific complex application area to act as an expert consultant to users. The system consists of a knowledge base and software modules that perform inferences on the knowledge and communicate answers to users questions.

Expert system can be used for either operational or management applications. Expert systems are related to knowledge-based decision support systems.

Knowledge-based information system: A knowledge-based information system is an expert system database of knowledge about a particular subject, including relevant facts, information, belief, assumptions, and procedure for solving problems. The basic unit of knowledge is expressed as an IF-THEN-ELSE rule.

Expert-Assisted IS:- The integration of expert systems into decision support systems and other types of information systems is expected to become a major characteristic of a trend towards expert-assisted information systems. This integration adds expertise as well as a knowledge base to information systems. An important example is the integration of expert systems and decision support systems with executive information systems.

The expert system is MACSYMA for MATH and MYCIN for MEDICAL (blood oriented) PROSPECTOR for GEOLOGY (stone/dust/liquid)

Expert system is used to simulate human intelligence, simulate means (artificial representation of some natural phenomena).

NEURAL NETWORK

Computer processor or software whose architecture is based on the human brain's mesh like neuron structure. Neural networks can process many pieces of information simultaneously and can learn to recognize patterns and program themselves to solve related problem on their own. Neural networks can be implemented on microcomputers and other traditional computer systems by using software packages that simulate the activity of a neural networks. Specialized neural networks coprocessor circuit boards for PCs are also available that provide significantly greater processing power.