Q. What is Software? Explain different types of software.

Software: Software is a kind of programs used to operate computers and related devices and enables a computer to perform a specific task. It is intangible in nature. Example: - Windows XP, Windows vista, Windows 7, MS-office etc.

Generally there are two types of software:

1. **System Software**: It is collection of programs designed to operate, control, and extend the processing capabilities of the computer itself. System software is generally prepared by computer manufactures. It creates the interface between computer hardware and the users. **Examples:** Operating System, Compilers, Interpreter, Assembler etc.

2. **Application Software:** It is the set of programs necessary to carry out operations for a specified application related to the users such as payroll processing, inventory control or word processing etc. It is also designed by programmers but for business or commercial purpose. Example: Ms-Office (Ms-Word, Ms-Excel, Ms-Power point, Ms-Access), Tally, Adobe Photo Shop, Adobe Page maker etc.

Explain different types of Programming Languages.

There are **two major types** of programming languages. These are **Low Level Languages** and **High Level Languages**.

Low Level languages are further divided in to **Machine language** and **Assembly language**.

Low Level Languages: The term low level means closeness to the way in which the machine has been built. Low level languages are machine oriented and require extensive knowledge of computer hardware and its configuration.

Machine Language: Machine Language is the only language that is directly understood by the computer. It does not need any translator program. We also call it machine code and it is written in the form of 1's (one) and 0's (zero). When this sequence of codes is fed to the computer, it recognizes the codes and converts it in to electrical signals needed to run it.

Advantage:

- Program of machine language run very fast because no translation program is required for the CPU.

Disadvantages

- It is very difficult to program in machine language. The programmer has to know details of hardware to write program.
- The programmer has to remember a lot of codes to write a program which results in program errors.
- It is difficult to debug the program.

Assembly Language

Assembly Language understand 0 (Zero) To 9 (Nine) and A To Z and a translator or converter program is required to translate the Assembly Language to machine language and vice versa. This translator program is called `Assembler`.

Advantages:

- Assembly Language is easier to understand and saves a lot of time and effort of the programmer.
- It is easier to correct errors and modify program instructions.
- Assembly Language has the same efficiency of execution as the machine level language. Because this is one-to-one translator between assembly language program and its corresponding machine language program.

Disadvantages:

- Assembly language is machine dependent.
- A program written for one computer might not run in other computers with different hardware configuration.

High Level languages

High Level languages are simple languages that use English and mathematical symbols for its program construction and a translator or converter program is required to translate the high level Language to machine language and vice versa. This translator program is called `Interpreter and Compiler

Advantages of High Level Languages

- Higher level languages have a major advantage over machine and assembly languages that higher level languages are easy to learn and use.
- It is because that they are similar to the languages used by us in our day to day life.

Interpreter: This language processor converts a HLL(High Level Language) program into machine language by converting and executing it line by line.

Compiler:-It also converts the HLL program into machine language but the conversion manner is different. It converts the entire HLL program in one go, and reports all the errors of the program along with the line numbers.

Q. Describe Computer Generations.

Answer: ## Generation of Computer:

Generation of computer means major technological development which makes the computer smaller, cheaper, powerful, efficient and reliable devices.

Followings are the Computer Generations:

First Generation - 1940-1956

The first Generation computers used vacuum tubes for circuitry and magnetic drums for memory. They were very expensive, very large in size, slow in processing and had less storage

capacity. They consumed lots of electricity and produced lots of heat so air condition was required. They used machine level language for programming.

Second Generation - 1956-1963

In Second generation computers transistors were used instead of Vacuum Tube. The transistor was far superior to the vacuum tube, allowing computers to become smaller, faster, cheaper, more energy-efficient and more reliable than the first-generation. High-level programming languages were also being developed at this time, such as early versions of COBOL and FORTRAN. Second generation computers still required air conditioning.

Third Generation - 1964-1971

Third generation computers used Integrated Circuit(IC). One small chip consisting of the capacity of **300 transistors**. These ICs are known as *Chips*. A single IC has many transistors, registers and capacitors built on a single thin slice of **Silicon**. Computers of this generation were small in size, low cost, large memory and processing speed is very high. These devices consumed less power and generated less heat. The maintenance cost was quit low because hardware rarely failed. They used high level language for programming.

Fourth Generation - 1971-1980

Forth generation computers are microprocessor-based systems. An IC containing about 100 components is called LSI (Large Scale Integration) and the one, which has more than 1000 such components, is called as **VLSI (Very Large Scale Integration)**. It uses *large scale Integrated Circuits* (LSIC) built on a single silicon chip called microprocessors. Due to the development of microprocessor it is possible to place computer's *central processing unit* (CPU) on single chip so these computers are called microcomputers. These are very small and cheapest compare to other generations. They are portable and quit reliable. These machines generate negligible amount of heat, hence they do not require air conditioning. Hardware failure is negligible so minimum maintenance cost is required.

Fifth Generation:- 1980-till Date

Fifth generation computing devices, based on artificial intelligence and still in development. Artificial Intelligence is the branch of computer science concerned with making computers behave like humans. The goal of fifth-generation computing is to develop devices that will respond to natural language inputs and be capable of learning and self organization.

The main features of fifth generation are:

- ULSI technology
- Development of true artificial intelligence
- Development of Natural language processing
- Advancement in Parallel Processing
- Advancement in Superconductor technology
- More user friendly interfaces with multimedia features
- Availability of very powerful and compact computers at cheaper rates

Classification of Computer:

Computers are classified according to their structure, data processing speed and memory size etc. computers are classified into following four main groups.

1. **Super Computer. 2. Mainframe Computer 3.Mini Computer 4.Micro Computer**.

1. Supercomputer: It is the most powerful, fastest, very expensive and big computer. Generally, it is use to process large amount of data and to solve the complicated scientific problems. It can perform more than one trillion calculations per second. It has large number of main memory, secondary memory and processors. In a single supercomputer thousands of users can be connected at the same time and the supercomputer handles the work of each user separately. India's first Supercomputer was PARAM 8000 was introduced in 1991. Generally it is used in weather forecasting, designing, aircrafts, design of drugs and modeling etc

2. Mainframe Computers: It is also powerful computer and process large amount of data. It has less memory and processor compare to supercomputer. The mainframe computers are specially used as servers on the World Wide Web. The mainframe computers are used in large organizations such as Airlines, Universities, Banks, insurance company's process large number of transactions on-line. These are a few manufacturers of mainframes (e.g., IBM and Hitachi). These computers are much bigger and faster than microcomputer and minicomputer.

3. Minicomputers: These computers are small in size and provide less processing speed compare to mainframe and super computer. These computers are also known as midrange computers because it is cheaper compare to other computer. The minicomputers are used in business, education and many other government departments. Minicomputers are commonly used as servers in network environment and hundreds of personal computers can be connected to the network with a minicomputer acting as server like mainframes, minicomputers are used as web servers.

4. Microcomputer: The microcomputers are also known as personal computers or simply PCs. Microprocessor is used in this type of computer. These are very small in size and cheaper than other computer. These computers are generally divided into desktop models and laptop models. The IBM's first microcomputer was designed in 1981 and was named as IBM-PC.

Different types of Computer:

1. **Digital computers:** The Digital computers work on the principle of binary digit "0" and "1". Each one is called a bit. These systems are more accurate and faster than other. Digital computers are suitable for complex computation and have higher processing speeds. Generally it is used in the field of design, research and data processing.
2. **Analog computer:** Analog Computer is a computing device that works on continuous range of data such as voltage, air pressure, temperature, speed etc. Analog computer

calculates the result by measuring the continuous changes in these quantities. Analog computers do not require any storage capability because they measure and compare quantities in a single operation. Examples : Speed meter, air pressure measurement devices, rain gauge etc. Speedometer of a car measure speed in terms of km/h and the change in temperature is measured by a thermometer in degrees.

3. **Hybrid computers:** A hybrid computer combines the desirable features of analog and digital computers. It is mostly used for automatic operations of complicated physical processes and machines. Now-a-days analog-to-digital and digital-to-analog converters are used for transforming the data into suitable form. Hybrid computers are mainly used for specialized tasks i.e Weather forecasting, Air Defense, Radar Controlling systems and Digital petrol pump etc.