

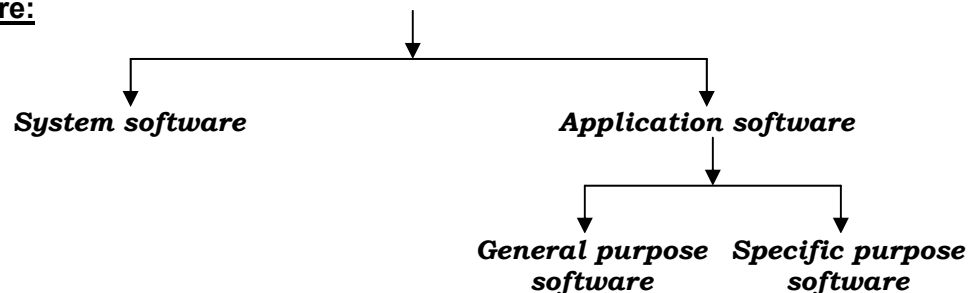
3. Software

Q.No.1. Define the term Software. Write about different types of software? (RTP)

Software:

- » The term Software is used to describe the instructions that tell the hardware how to perform a task. Without software, hardware cannot do any work. Thus software is the means of controlling hardware.
- » In early days of computer, only standard programs supplied by the computer manufacturers were known as software. But now-a-days the term has got much wider meaning. It includes programs developed by the user or procured by him, from an organisation dealing in software.

Types of Software:



System programs or system software: These programs are designed to make the computer easier to use. A system program can't solve a particular problem, but it makes easy to use necessary application programs. An example of system software is an **Operating system**.

Application programs or application software: These programs are designed for specific computer applications. For example, a programme that prepares payroll for a business is an application programme.

Q.No.2. Define the term Firmware. (N95-2M, M01, M05-5M, N03-1M)

- » Firmware or micro programs refer to a series of special program instructions. In a computer, the most basic operations such as addition, multiplications etc. are carried out by hard wired circuits.
- » These fundamental tasks are combined in the form of micro programs to produce high level operations such as move data, make comparisons etc.
- » These micro programs are called firmware they deal with very low level machine operations.
- » For example, a small program for computing square root can be stored in computer's secondary memory or it can also be embedded into CPU's circuitry. But the later is very expensive. It is economical only if the square root has to be calculated for large number of times.
- » Generally simple arithmetic/logical operations (like add, subtract, multiply, divide) are provided in the CPU circuitry so that they can be performed at a very high speed. These operations are repeated for number of times in both business and scientific applications.

Q.No.3. What is meant by System Software? Write about different types of system software?

Meaning: These programs are designed to make the computer easy to use. A system program can't solve a particular problem, but it makes easy to use necessary application programs. It consists of programs that control and support the computer system and its data processing applications. Following are different types of system software:

- | | | |
|-------------------------|------------------------|--------------------|
| » Programming languages | » Operating systems | » Utility programs |
| » Diagnostic routines | » Language translators | |

Who will provide such SW? A wide variety of above software are usually provided by computer manufacturer. But some software is also provided by software companies. Generally these companies charge extra amount for such software. But some manufacturers provide this software without any extra cost.

Q.No.4. What are “Programming Languages”? Write about different programming languages available?

Programming Languages:

- » Human beings use natural languages such as English and Spanish to communicate with each other. Similarly a programming language is used to communicate with computer through a program.
- » For each specific task a program must be written so that computer can interpret ^(=understand) it. A program is developed to direct processing steps of the computer. Every instruction must follow specific rules that form a language.
- » Generally programming languages are provided by the manufacturer.

Types of Languages:

- | | |
|---------------------------------------|--|
| » Machine / 1st Generation Languages | » Assembler / 2nd Generation Languages |
| » Compiler / 3rd Generation Languages | » 4th Generation Language |

Q.No.5. Write about Machine or 1st generation languages.

Meaning:

- » In the early days of computer, each particular computer model has a unique language, which is based on the internal circuitry of the computer and it is developed and provided by the computer manufacturer.
- » The computer manufacturer supplies a manual of codes for various operations which are unique to that computer.
- » It is the language of the computer and it is the only language which a computer can understand without any translation.

Advantages:

- » These programs do not need any translation. Thus translation time can be saved.
- » The processing speed of programs written in these languages is very high.
- » It provides great security to programs because program developed by one person is not understandable to other persons.

Disadvantages:

- » Writing a program in machine language is very difficult and it is also error prone.
- » Programs written for one computer model cannot be used for other models. That is why this language is also known as machine-oriented language or machine dependent language.
- » This is a machine oriented language. So, the programmer must know the language for each and every new machine/model.
- » It is very difficult to make changes to programs.
- » It is a low level language and is not user friendly.

Q.No.6. Write about Assembler or Second Generation Languages.

Meaning:

- » Assembler Languages are at the next level to machine languages.
- » They are also known as symbolic languages because they employ symbols for both arithmetic and logical operations and such symbols are called mnemonic codes.
- » Such standard symbols were supplied by computer manufacturer.
- » Programs written in this way are required to be translated into machine level language.

Advantages:

- » Programs written in assembly language are more efficient than that of machine language.
- » Programming in assembly language is much easier than in machine language.

- » Since assembly language is machine oriented, a programmer can write programs that suit the capabilities of the computer i.e., the program would occupy minimum storage and take less processing time.
- » Flexibility i.e. wherever required, additional instructions can be inserted.

Disadvantages:

- » Each type of computer has its own assembly language. So, it is difficult to learn and remember.
- » A program written for one computer will not run on a computer of different manufacturer.
- » To solve a particular program, the programmer has to write large number of statements than a programmer using other high-level programming languages.
- » It is very difficult to write, read and maintain programs in Assembly language than that of high-level languages.

Where they are used?

- » Normally assembly languages are not used to write programs for general business applications such as payroll, accounts receivable, billing etc. These languages are used to write system programs and other types of programs in which control or efficiency are important.
- » These languages are used where fast execution is essential.

Q.No.7. Write about Compiler or Third Generation Languages (High-level-languages).

Meaning:

- » Compiler languages are also known as high level languages or procedural languages because they are highly procedure oriented.
- » They use plain english like and mathematical expressions. An instruction in these languages is usually called a statement.
- » Programs written in third-generation languages have to be translated into machine language using a compiler or interpreter.

Advantages:

- » It is easy to learn and write error free programs.
- » Programs written in these languages are much more compact than those written in lower level (machine and assembly) languages.
- » Economical than low level languages.
- » They are very close to human languages.

Disadvantages:

- » Programs written in compiler language occupy more storage space and require more processing time than programs written in assembly language.
- » More time is wasted on translation.

Where they are used? Frequently used programs are written in low level languages and rarely used programs are written in high level languages. **E.g.:** FORTRAN, COBOL, BASIC, PASCAL, C etc.

Q.No.8. Write about Fourth Generation Languages. (N01-3M)

Meaning:

- » These are high level, non-procedural languages designed to produce spectacular results with minimum programming effort.
- » With 4GLs special purpose queries or "reports can be prepared by the user by himself, in just few minutes.
- » 4GL's include English like instructions, limited mathematical manipulation of data, sorting and selection of records by a given criteria, automatic report formatting etc.

Types:

- » Production oriented 4GLs – Used by computer professionals for creating information systems, etc.
- » User oriented 4GLs – Used by end users to query databases, etc.

Advantages:

- » To generate a report or to make an enquiry, minimum training and practice is sufficient.
- » Most of the fourth-generation languages are machine independent i.e. they can be used on any type of computer.
- » Easy to learn and use.
- » Requires few instructions to write a program than a third generation language.
- » Program development is faster than 3rd generation languages.

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Disadvantages:

- » But 4GLs require more computer storage to perform a particular operation.
- » Large programs with multiple users are better handled by 3GLs or an assembly language.
- » Slow response time.

Suitability: Many 4GLs are used to get information from files and databases. These 4GLs contain a query language, which is used to answer queries from a database. They are used for writing business application programs and not suitable for scientific application programs or system programs.

Note: 3rd generation Vs. 4th generation languages. (M05-4M, M08-6M)

Q.No.9. Write about Object Oriented Languages. Explain its advantages? (M04,N06,N08-5M)
Meaning:

- » It is a programming language which develops programs using objects. An object is a predefined set of program code that is written and tested. This object will always behave in the same way. So, it can be used in several other applications.
- » All programs consist of some specific tasks such as saving data, printing data, retrieving data, calculations etc. In object-oriented programming, an object is written for each specific task and saved in a library so that anyone can use it.
- » In this method objects are combined and a small amount of code is sufficient for finishing the program.

Advantages:

- » Graphical interface, ease of use, faster program development and improved productivity.
- » Programs are more reliable and contain less number of errors.
- » Economical than other languages.
- » New objects can be created or old objects can be modified, reused, copied.

Disadvantages:

- » Huge amount of initial development costs and huge amount of start-up time.
- » Programs are slower and use more memory and computer resources than traditional methods. As a result, it requires powerful PCs and workstations.

E.g.: Some common object-oriented languages are Small talk, C++, Visual Basic and Java.

Q.No.10. What are high level languages? What are the 2 types of high level languages? (N95)

- » High level languages provide a level above assembly languages.
- » Instead of mnemonic codes they use English and mathematical symbols. Thus a programmer can concentrate more on the logic of the problem.

- » They enable the programmer to create programs quickly and easily, but the program should be translated into machine language by an interpreter or compiler. A translating program that converts high-level language instructions into machine language is called Compiler.
- » They are also called as Procedure oriented languages.
- » For example, COBOL (Common Business Oriented Language) is a high level language used for business related problems. On the other hand FORTRAN (Formula Translator) is another high level language used for scientific applications.
- » There are two high level languages – procedural languages & Object Oriented languages.

Q.No.11. What are the advantages of high level languages? What are its limitations?**Advantages:**

- » They are machine independent i.e. a program written for one computer can easily work on another computer.
- » They are easy to learn because they use english like words and common mathematical symbols.
- » Programs written in high level languages are easy to modify and debug.
- » Overall cost of development of software packages decreases.

Limitations:

- » Program written in high level language is required to be translated into machine language with the help of compilers. This requires additional time and storage space.
- » Since high level languages are machine independent, it is not possible to design programs that suit the capabilities of the computer.

Q.No.12. What is meant by an Operating System? (M97, N05-1M) What are the basic functions performed by an OS? (M98, M99, M02, N03, M07, M08, N08-5M)**Introduction:**

- » Operating System is a Master control program that runs the computer.
- » In olden days lot of time used to be wasted in setting up computer and everything was supervised by an operator. Every time the computer is started, the operating system must be compiled / assembled. Similarly, several application programs were required to be read into the CPU everyday. Thus lot of time was wasted in setting up the computer.
- » This wastage of time can be avoided by maintaining all programs in storage devices. The required program can be recalled into CPU more quickly than in olden days.
- » Operating systems optimize the man-machine capabilities. Operating systems are based on the concept of modularity.
- » Operating systems are also known as “executive systems” or “Control systems” or “monitor systems”.

Functions of an O/S: (M98, M99, M02, N03)

- a. Schedule jobs:** An operating system can determine the sequence in which jobs are to be executed.
- b. Manage hardware and software resources:** Operating system first loads the user's application programs on to the computer's primary memory and executes it. It makes various hardware units to perform as per the specifications of the application program.
- c. Maintain system security:** To maintain security, operating system maintains a system of passwords in the organization. To enter into a system the user has to enter his password.
- d. Enable multiple user resource sharing:** OS can handle the scheduling and execution of application programs for many users at the same time. This is called multiprogramming.

- e. Handle Interrupts:** An interrupt is a technique used by the operating system to temporarily suspend the processing of one program in order to execute another program. Interrupts are issued when a program requests an operation or when the program exceeds some predetermined time limit.
- f. Maintain usage records:** OS can record the amount of time used by each user for each system - the CPU, secondary storage, input and output devices.

Q.No.13. Write about file and directory structure of an Operating System? (Or) What are files and directories?

File Names:

- » A file is a collection of related data, saved on a specific area of a storage medium.
- » To use a file the file must have a name. The name is also significant because it indicates the type of data stored in the file. (OSs such as Windows 95 and Windows NT use small icons to identify nature and type of a particular file.)
- » For most OSs the file name consist of two parts known as prefix & suffix (extension).
- » Prefix is supplied by the user. Suffix is supplied either by user or computer Program being used.
- » Generally, prefix is separated from suffix by full stop or slash.

Below is a list of some typical DOS/Window file names with appropriate suffixes:

NOTE.TXT	Text file	(.TXT-Text)
LETTER.DOC	Document file	(.DOC-Document)
MENU.EXE	Executable file	(.EXE-Executable)

Directories:

- » A set of files is called Directory. It is like drawer in a filing cabinet. It consists of several files.
- » A computer disk can have multiple number of directories. If necessary, a directory can have number of sub-directories.
- » The purpose of directories is to partition the computer's disk/storage devices in an organised and meaningful manner.

Q.No.14. What is meant by Graphical User Interface? (M98, M02, M03, N04-5M, M08-1M)

- » During 1980, micro computer's operating system was strictly text-based, command driven software. Users were required to issue commands to the operating system.
- » Such commands were syntax sensitive. For constructing a command the user must follow the syntax strictly; otherwise an error message is displayed on the screen.
- » Today we are using user-friendly, graphics environment called Graphical User Interface or GUI.
- » In GUI environment, a unique icon will be given for each command.
- » With GUI, the user can issue a command by selecting options from a menu or by positioning cursor over the appropriate icon. Thus user need not memorise and enter commands.
- » For example, Microsoft Windows supports GUI.

Q.No.15. Write about different operating systems available in the market?

MS/PC-DOS:

- » As IBM was about to finalise the PC, it started to negotiate with other computer companies to get a suitable OS for the product.
- » Initially IBM made negotiations with Digital Research. Digital Research already owned personal computer operating system called CP/M (Control Program for Micro computer) which was, at that time, the market leader in microcomputer OS's. But it failed.

- » In 1980, IBM and Microsoft started negotiations for the production of a suitable PC OS.
- » It purchased 86 DOS from Seattle Computer Products. With joint minimum effort, 86 DOS was totally modified and upgraded and a new 16 bit OS called PC-DOS was released.
- » In 1981, IBM introduced its PC with PC-DOS as its operating system.
- » Microsoft released an almost identical (=similar) version of this OS under the name of MS-DOS.
- » MS-DOS was supplied with PC compatible computers & PC-DOS was supplied with IBM PCs.

MS Windows:

- » The first version of Microsoft Windows OS was launched in 1983, but it was not successful.
- » In 1990, it launched windows 3.0 and it became the world's best selling 16-bit GUI OS. By the end of 1996 Microsoft had sold more than 45 million copies.
- » The main reason for its success is the overall design and GUI.
- » Windows 3.0 enabled true multitasking and also allowed users to use programs written for MS / PC-DOS.
- » To work effectively, a PC must have minimum of 4 MB of RAM and a 386 Processor.

Window 95:

- » Windows 95, a 32 bit OS was released in August 1995. Microsoft took 3 ½ years to develop it.
- » It was a gigantic task and was estimated to have taken 75 million hours of testing.
- » To run Windows 95 users need a computer with 386DX or higher processor with a minimum of 4 MB of memory (8MB is recommended) along with a hard disk of 50 MB as well as 3.5 inch disk drive or a CD-ROM drive.
- » Windows 95 was designed to have certain critical features over and above what was already supplied by Windows 3.1. These include:
 - A 32-bit architecture (=design) which provides for multitasking environment. This allows user to run multiple programs at a time.
 - One click access i.e. the user need not double click the mouse to activate an application.
 - The user can employ long file names.
 - 'Plug and play technology' - enables users to connect various peripheral devices with minimum effort.
 - Windows 95 is also network ready. In other words, the OS is designed for easy access to network resources.
 - In addition Windows 95 is backward compatible.

Windows NT: (M04-5M)

- » Unlike Windows 3.0 and Windows 95, Windows New Technology (NT) is a critical OS for network.
- » It is a 32 bit OS. It is very much preferred for Intel's more powerful Pentium range of processors.
- » Windows NT 4.0 is very much similar in appearance to Windows 95 (Although not exactly same).
- » Important features include:
 - A stable multitasking environment,
 - Enhanced security features,
 - Increased memory support,
 - Network utilities,
 - Windows NT is more expensive than other Windows OSs and & require lot of processing power.

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OS/2:

- » In 1987 IBM and Microsoft announced a new PC OS called OS/2 (Operating System Two). Unfortunately, the original OS/2 was not very successful because it was unable to support many existing PC applications. So users faced compatibility problems.
- » The initial failure of OS/2 showed considerable impact on IBM - Microsoft alliance (=group, association). After that IBM and Microsoft began to go in their separate ways.
- » Microsoft left OS/2 to IBM and chose to concentrate on MS-DOS and Windows.

Q.No.16. Write about MS-Windows. (M95, M98, M03, M05, N08-5M)

- » Microsoft Windows is a Graphical User Interface software for IBM PC and its clones, introduced by Microsoft Company.
- » The name 'Windows describes how the software functions it runs one or more applications in windows which are rectangular areas displayed on the screen.
- » It defines a new platform or standard on which other application software packages are written.

Features:

- a. **Windows is user friendly:** Windows employs a graphical user interface. Thus user need not memorise and enter commands through keyboard.
- b. Windows enables multiple programming.
- c. **Windows enables user to work with large files:** Large Data Bases, Spread Sheet files and Word-processing documents can be used with windows. Without Windows, a file containing one or two chapters of a book might not fit into available RAM.
- d. **Windows permits information to be passed between applications:** With Windows, text in a word-processing document can be transferred in seconds to a data base record. These types of information transfers are cumbersome ^(=bulky, burdensome) and time consuming with MS-DOS.
- e. Application software packages created for MS-DOS run under windows also.

Q.No.17. What are Interleaving Techniques that are commonly used by operating system for large computer systems?

Large centralized systems can support multiple users simultaneously. The user's terminals may have limited processing capacity and actual processing may be entirely done by the large computer that is connected to the terminals. Such types of systems require an operating system which can share the central processor. To do this, the operating system combines (interleave) the processing work of multiple users or applications in such a manner that resources are used efficiently. Commonly used interleaving techniques are:

- » Multiprogramming,
- » Foreground/Background processing,
- » Multi-tasking,
- » Virtual memory, and
- » Multi-processing.

Q.No.18. What is meant by Multi Programming? (M96, M97, N08-1M)

- » Simultaneous processing of multiple, independent programs by interleaving ^(=leaving some time gap in between) their execution is called Multi programming. In other words, it is defined as execution of two or more programs at a time, that all reside ^(=exists) in primary storage.
- » It is a facility available in an operating system.
- » CPU can execute only one instruction at a time i.e. it cannot execute instructions from two or more programs simultaneously. However, it can execute instructions from one program then from second program then from first again and so on. This type of processing is referred to as "concurrent execution".
- » In multiprogramming, storage area is allocated for each program and such areas are called "partitions".
- » Each partition will have some form of storage protection and priority to ensure that a program in one portion will not accidentally write over and destroy the instructions of another partition.
- » With the help of this facility, all parts of the system, processor, input and output peripherals can be used concurrently. Thus the entire system can be more effectively.

Q.No.19. What is meant by Multiprocessing? (M08-1M)

- » Multiprocessing (or parallel processing) refers to the use of two or more central processing units, linked together, to perform the work simultaneously.
- » The available CPU's can execute different instructions of the same program or different instructions of different programs at the same time.
- » Using multiprocessing facility many complex operations can be performed at the same time.
- » Although parallel processing is not yet widespread, it will be the trend in future.
- » Because of the availability of cheaper but more powerful processors, many computer manufacturers are now designing hardware and software systems to do multiprocessing.
- » Since several machines can work as a team and operate in parallel, jobs can be processed much more rapidly than on a single machine.
- » Since a micro processor is very costly, multiprocessing is very expensive.

Note: Multi Programming Vs. Multi processing. (M96, M00, M05 – 5M, RTP)

Q.No.20. Foreground Processing / Background processing.

Usually, it is possible to logically partition main memory into separate areas. With this 2 different operating systems can work on the same system because each will have its own memory to manage in its own way. Partitioning also allows separate "job streams" to be set up. A common procedure is to setup a partition for high-priority tasks (called a foreground partition) and one for low-priority tasks (called as background partition). With foreground/background processing, foreground jobs are usually handled first. When no foreground task is waiting for processing, the computer goes to the background partition and starts processing tasks there. When foreground tasks come into the job queue, the computer leaves the background partition and resumes work in the foreground.

Q.No.21. Multi Tasking.

Multi-tasking refers to the operating system's ability to execute two or more tasks of a single user concurrently. Most of the operating systems used in micro computers were single-user operating systems. These operating systems allow the user to work on one task at a time. For example, in many single-user operating systems, a word-processing user cannot type a document while another document is being printed out on an attached printer. For microcomputers, multi-tasking operating systems provide single users with multiprogramming capabilities. This is often accomplished through foreground/background processing. Multitasking operating systems for microcomputers-such as Windows, OS/2, UNIX, XENIX, and Macintosh System 7 - only run on powerful microprocessors. Old machines with less powerful microprocessor typically use single-user operating system.

Note: Multi Programming Vs. Multi tasking. (M03, M08 – 4M)

Q.No.22. What about Virtual Memory? (M00-5M)

- » Virtual Memory or Paging is a facility provided by Operating System to a computer System. With the help of this facility, large size software can be loaded on small size RAM.
- » Most of today's softwares like WINDOWS, MS Office, etc. require huge amount of RAM.
- » Loading of such a large size software into smaller size RAM is possible by the facility called Virtual Memory / Paging.
- » As a part of this facility the large size software gets divided into small parts modules. Each module will be smaller than RAM's capacity. These modules are prepared in such a way that each module can perform a set of tasks.
- » One by one, the modules are loaded into RAM and perform their task. After one module work is over, the next module is loaded on to RAM overwriting/overlaying the first module.

- » At the end, it looks as if RAM has suddenly expanded to the size of software and allowed loading of such large software. Thus, Virtual Memory is an illusion and not reality. Hence it is called so.
- » The overlaying modules are also called pages. Thus this technique is also known as Paging.

Dumping: It is the other aspect of Virtual Memory. When RAM capacity is insufficient to hold data, a small part of the secondary storage disk space is taken up by RAM, to hold some semi-processed data. This is temporarily copied to the disk and is removed from the disk after processing. But user feels that RAM capacity has increased to the requirements of the user. This facility also comes under Virtual Memory.

Note: Main memory Vs. virtual memory. (M03-4M, RTP)

Q.No.23. Sub Routines. (M05, N05, N07-1M, RTP)

A sub-routine is a set of instructions designed to perform a well defined arithmetical or logical operation. Sub-routines are particularly useful when it is required to perform the same operation several times in a single program. Detailed instructions are once laid down. Whenever it is needed, a branch instruction will be given. After the subroutine is completed, control is returned to the main program.

These programs are also known as application packages. They are ready made solutions to several problems. Subroutine programs may be written by users or may be supplied by manufacturers. By using these subroutines, the work of a programmer is simplified to a great extent.

Advantages of sub-routine:

- » They help in performing routine but tedious work such as preparation of examination results, income tax calculations, editing of data for input and output, etc.
- » Storage space is saved as there is no duplication of instructions.
- » Programming time is reduced because a sub-routine was already tested & proved in another application.
- » They can be employed many times without wastage of programming effort.
- » They can be written by a programmer not involved in the main programs.
- » It is easy to locate faults in programs that are constructed using sub-routines.

Q.No.24. What are Utility Programs or Service Programs? / Explain the term utility routine? (M07-1M)

- » Utility programs are programs that perform system support tasks.
- » These programs are provided by computer manufacturers to perform tasks that are common to all data processing installations.
- » Some utility programs may be developed as separate programs and some may be included in application programs.
- » Generally following tasks are performed by utility programs:
 - Sorting the data.
 - Editing the output data.
 - Converting data from one recording medium to another, viz., floppy disk to hard disc, tape to printer, etc.
 - Dumping of data to disc or tape.
 - Tracing the operations of program.

Q.No.25. Write about Sort utilities.

- » It is a utility program used to sort data i.e. arranging the data in a particular order, according to a key filed.
- » For example, we have a file of student records. We could declare "name" as the primary sort key and arrange the file alphabetically on the basis of name field. This is useful to produce student directory.
- » Alternatively we can sort the file by name and then within name, by date-of-birth. Hence, we will declare name as the primary sort key and date-of-birth as the secondary sort key.

- » Examples described here use only one or two sort keys. But many sorting packages can identify 12 or more sort keys and can arrange the records in either ascending or descending order on each declared key.
- » Generally sort utilities are found in mainframe and minicomputer environments. (Now these are available even with Microcomputers).
- » In case of micro computers, these sort utilities are bundled with application packages. For example, sort routines are commonly found in spreadsheet and database management software.

Q.No.26. Write about Spooling software/Spooling. (N96, M00-5M, M03, M05, M07-1M, N08-5M)

Meaning: Spooling (Simultaneous Peripheral Operation On Line) is a technique used for dynamic job processing. It allows input and output operations to occur simultaneously with processing operations. It refers to procedures followed by the user in order to minimise the high speed CPUs slowing down and waiting whenever direct inputs and outputs take place to the CPU. These procedures are followed by the user both during input and output.

During output:

- » In Spooling during output, whenever output has to be sent from the CPU to the printer, output is re-directed and stored in secondary storage devices. Subsequently, the stored output gets printed.
- » During first re-direction, the output is sent from CPU to storage device at a very high speed and immediately the CPU gets released for other jobs. For subsequent printing, CPU is not required.

During Input:

- » When data or programs are required to be loaded from tape to RAM, first files are copied or dumped from tapes to Disks and subsequently files are loaded from disk to CPU.
- » This procedure reduces the CPU's waiting time.

Thus the main purpose of spooling software is to compensate for the speed differences between the computer & its peripheral devices.

Q.No.27. Write about Text editors.

- » Text editor is a form of utility program.
- » Text editors are used to create or modify text data in a file.
- » These utilities are widely used by professional programmers for cutting and pasting programs together, changing data files by eliminating certain data fields, changing the order of certain data fields, adding new data fields and changing the format of data.
- » Although text editors closely resemble word processors, they are not same. Word processors are specifically designed to prepare "document" materials such as letters and reports. But text editors are designed to prepare "non-document" instructions in computer programs or data in files.
- » Most word processors contain extensive (=huge number of) capabilities of text formatting and document printing. These capabilities are not found in Text editors.

Q.No.28. Some other utility programs being used in a micro computer operating system.

Some of the commonly used utilities (other than Sort utilities, text editors, spooling software) for microcomputer operating systems are discussed below:

- a. **Disk copy programme:** This program is used to copy the entire contents of one diskette to another diskette. It is generally used to make a backup or archive copy of some data or application program.
- b. **File copy programme:** This program helps to copy just one file or group of files to another diskette.
- c. **Disk formatting programme:** Whenever a diskette is purchased it requires to be divided into tracks and sectors. This process is called formatting and such formatting is done by this program.
- d. **File deletion programme:** This program helps to delete a particular file on a diskette.

- e. **File viewing programme:** It is used to view the contents of a file on the display screen of the microcomputer.
- f. **Directory programme:** This program helps to view the names of data and programme files, which are stored on a disk or diskette. It addition, it gives following additional information: memory occupied by different files, day they were last received and amount of unused storage space left on storage devices.

Q.No.29. Write short notes on Diagnostic Routines. (N95,N04,M07-1M)

- » These programs are usually written and provided by the computer manufacturers. They assist in program debugging. They usually trace the processing of the program being debugged.
- » They also help to identify the hardware accessories supplied by the manufacturer. They identify the type of processor, BIOS supplied, keyboard attached, type of monitor supplied with the computer manufacturer, etc.
- » Using the program, one can find answer to the following questions:
 - What type of processor does the computer use?
 - Is there a math coprocessor in the computer?
 - Who is the BIOS manufacturer?
 - What is the total amount of conventional memory in the computer?
 - What type of keyboard is attached to the computer?
 - What is the display type?
 - Is there any mouse attached to the computer? What type is it and who made it?

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Generally diagnostic routines are treated as a category of utility or service programs.

Q.No.30. Define the term Language Translator? Write about different types of translators available? (M06-5M, RTP)

A language translator or language processor accepts statements in one language and produces equivalent statements in another language. It reads the statements of source language and converts them into statements of other language. Most computer installations have several language translators, one for each programming language. The three most widely used language translators are:

- a. **Assembler (N07-1M):** It translates program written in an assembly language into machine language. To develop a program, assembly languages use mnemonic codes and assembler translates such codes into machine language.
- b. **Interpreter:** Interpreter is a translation software that translates, interprets and executes one line at a time. With an interpreter, each statement is translated into machine language just before it is executed. No object module or load module is produced. Generally, program is first developed using interpreter and then using compiler.
- c. **Compiler:** Compiler is a translation software which translates programs written in high level language to machine level language. A compiler translates the entire program into machine language before the program is executed.

Q.No.31. Write about Compilers. (M97, N05, N08-1M)

Introduction:

- » Compiler is a translation software which translates the programs written in high level language to machine level language.
- » Compilers are used to translate high-level languages such as COBOL, FORTRAN, and Pascal into machine level language.
- » A compiler translates the entire program into machine language before the program is executed.

Compilation Procedure:

- » Program is entered into computer system and submitted to the appropriate compiler. For example, a COBOL program is input to a COBOL compiler; a Pascal program to a Pascal compiler.
- » The program submitted for compilation is called source program. The compiler translates the program into machine language, producing an object program.
- » Then, another software program called linkage editor binds the object module of this program to object modules of any sub programs.
- » The resultant program, which is ready for computer execution, is called load program (or load module). Actually the computer executes this load program.
- » Programs can be saved on disk either in source, object or load-module forms.

Q.No.32. Write about Interpreters. (N06, M08 – 1M)**Introduction:**

- » Interpreter is translation software that translates, interprets and executes one line at a time. With an interpreter, each statement is translated into machine language just before it is executed. No object module or load module is produced.
- » Generally, program is first developed using interpreter and then using compiler.
- » Programs written in simple languages such as BASIC are more likely to be interpreted than compiled because these programs are often developed on microcomputers.

Advantages:

- » They are usually easier and faster to use (i.e. the translation speed is high).
- » Generally they provide superior error messages to users. When a program contains an error, the interpreter can exactly identify the error because interpreters stop when errors are encountered ^(=come across). Thus interpreters help programmers to debug their programs. This increases programmer productivity and reduces program development time.
- » An interpreter requires less storage space in primary memory.
- » Interpreters are less expensive.

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Disadvantages:

- » Program statements are required to be translated over and over again.
- » Interpreters do not provide safety to programs.
- » Difficult to make changes to programs.

Note: Interpreter Vs. Compiler. (N94-6M, M99-5M, M04-4M)

Q.No.33. Write short notes on Application Program / Software.

An application program is a program used to solve a particular application or problem that is unique to a particular organization. Examples of such programs are payroll, General accounting, sales statistics, inventory control etc. Usually different organizations require different programs for similar application and hence it is difficult to write standardized programs. However, tailor-made application software can be written by software houses on modular design.

Note: System software Vs. Application Software. (N94-6M, N96, N99-5M, M04-4M, RTP)

Q.No.34. Write short notes on General Purpose Program / Software.

- a. This software provides the framework for a great number of business, scientific, and personal applications.
- b. Spreadsheet, database, Computer-Aided Design (CAD), word processing software etc. fall into this category.
- c. Most general-purpose softwares are sold as a package.
- d. The software is accompanied by user-oriented documentation such as reference manuals, keyboard templates, and so on.
- e. For example, an accountant can use spreadsheet software to create a balance sheet of a company.
- f. An aeronautical engineer can use CAD software to design an airplane or an airport. A personnel manager can use word processing software to create a letter and so on.
- g. Number of personal computer-based general-purpose software packages is available in the market.

Q.No.35. Define the term Word Processor? (N96, N97)

Word Processing: Word Processing means creating, typing and formatting of any kind of document. This document can be anything like letters, memorandum, account related documents, reports, etc.

Word Processor: Word processor is different from word processing. A word processor is an application software that helps in the production of such documents. In simple words, it is a text editor that allows us to type, edit and save text. The first word processing software was invented by IBM. The intention was to relieve secretaries from time consuming typing task. However, the present day word processor packages offer far more features than just editing words - they provide spell checking, designing and elaborate formatting features. With a word processor, one can easily change the way a document looks. Thus it is easy to present ideas in a coherent (=good, sound) manner. With a word processor one can:

- » Read and revise a document on screen,
- » Change the formatting to get the desired visual effect,
- » Increase productivity by automating,
- » Improve proof reading,
- » Produce as many copies as needed,
- » Save a document and work on it later.

Some of the popular word processing packages are:

- | | |
|---|-----------------------|
| » Save a document and work on it later. | » Professional Writer |
| » MS – Word | » Word perfect |
| » Perfect Writer | » MultiMate |
| » Word star | » Lotus Notes |

As of 1999, the most popular Word processing programs were Microsoft Word which is based on GUI.

Note: Text editor Vs. Word Processor. (M05-3M)

Q.No.36. Define the term electronic spreadsheet? (M96, M97-5M)

In day to day life, many transactions take place and it is humanly not possible to remember all of them. Hence we record them in a systematic manner for future reference; To help users, electronic spreadsheets are available. Spreadsheet applications are primarily designed to perform mathematical calculations. The Spreadsheet, as the name suggests, is like a large sheet consisting of several rows and columns. In appearance, it looks like a maths note book.

Besides calculations, spreadsheets can be used for working with data [information]. The latest version of spreadsheet program can serve as powerful data management tool. Using a spreadsheet program, one can not only store lot of data in the worksheet but also make use of different functions to arrange and analyse data in any way he likes.

Spreadsheet application also comes with powerful Graphic utilities. These utilities help the user to represent the data in a picture format. To achieve this task, these utilities make use of different charts and graphs that will be supplied along with spreadsheet application.

Currently the leading spreadsheet applications include - Microsoft Excel, Lotus 1-2-3, Quantro Pro. These programs are written in a combination of an assembler and high level languages, which are accessible to managers, accountants and other computer professionals. Even people with no programming experience can use these programs.

MS-Excel is one of the best spreadsheet applications available; possessing several enhanced spreadsheet features. One can use MS-Excel to make quick and easy financial analysis. One can also analyse data and create presentations with charts. MS-Excel allows user to retrieve data from external data sources and use it in the worksheets. MS-Excel can be used to create web pages with ease and also run queries on data available on the web.

Q.No.37. What is meant by Decision Support System? What are the characteristics of a Decision Support System? What are the components of a Decision Support System? (M06)

Introduction:

- » DSS's are information processing systems frequently used by accountants, managers and auditors to assist them for decision-making purposes.
- » The concept of DSS was developed in 1960's, after studying decision making several in organisations. These studies noted that managers require flexible systems which can respond to adhoc questions.
- » Advances in hardware technology, interactive computing design, graphics capabilities and programming languages contributed to this development.
- » Today Decision Support Systems are widely used in accounting and auditing.

Characteristic features:

- a. **DSS supports management decision making:** Generally these systems are used by top management for decision making purposes (For example, to decide whether to drop a product line or not, to increase the advertisement expenditure or not). These are also used by operational managers for management planning decisions (For example, to solve scheduling problems). DSS enhances ^(=increases) the quality of decisions. The system will recommend a particular alternative and the final decision is taken by the user.
- b. **Decision support systems solve unstructured problems:** Problems that do not have easy solutions and problems in which some managerial judgment is necessary are called unstructured problems and such problems can be easily solved by DSS. Generally decision support systems use non-routine data as input. It is difficult to collect such data and sometimes it may require estimates. An important characteristic of many decision support systems is that they allow users to ask what-if questions and to examine the results of these questions.
- c. **Friendly computer interface:** Generally Decision support systems are operated by managers and other decision makers, who are non programmers. So these systems must be easy to use. With the help of non procedural languages, users can easily communicate with the decision support system.

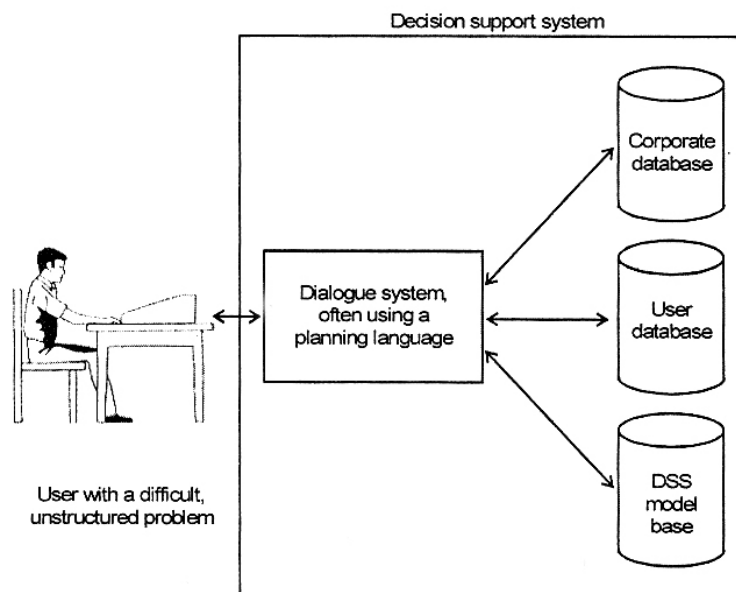
Components of Decision Support Systems: (M04, M06, N07-5M)

- a. **Users:** Usually, the user of a DSS is a manager with some unstructured or semi-structured problem. The manager may be at any level of authority in the organisation (e.g. either top level or middle level or bottom level managers). Generally, users do not need computer knowledge to use a decision support system.

- b. Databases:** Decision support systems include one or more databases. These databases contain both routine and non-routine data from both internal and external sources. The data from external sources include data about operating environment - for example, data about economic conditions, market demand for the organisation's goods or services and industry competition.

DSS users may construct additional databases. Some data may come from internal sources. An organisation generates this type of data in the normal course of operations - for example, data from financial and managerial accounting systems. The database may also capture data from other subsystems such as marketing, production and personnel. External data include assumptions about variables such as interest rates, market prices and level of competition.

- c. Planning languages:** Two types of planning languages that are commonly used in decision support systems are: (1) general purpose planning language and (2) special purpose planning language.
- d. Model base:** The model base is the "brain" of the decision support system because it processes data with the help of data provided by the user and the database. There are many types of model bases, but most of them are custom developed models that do some type of mathematical functions - for example, regression analysis, time series analysis, linear programming and financial computations. The analysis provided by model base is the key for user's decision.



Q.No.38. Write some examples for Decision Support System in the area of Accounting?

Decision support systems are widely used as part of an organisation's AIS. Many DSS's are developed in-house, to solve specific problems. Below are some of the illustrations of these systems.

- a. Cost Accounting system:** Cost structure is very complex in health care industry. It is very difficult to divide costs in the areas of supplies, expensive machinery, technology and a variety of personnel. Cost accounting applications help health care organisations to calculate product costs for individual products or services.
- b. Capital Budgeting System:** Companies require new tools to evaluate high-technology investment decisions. Decision makers need to supplement analytical techniques such as NPV and IRR with decision support systems. For example AutoMan is a DSS, designed to support decisions about investments in automated manufacturing technology, which allow decision makers to consider financial, non financial, quantitative and qualitative factors in their decision-making process. Using this DSS, they can evaluate upto 7 investment alternatives at a time.
- c. Budget Variance Analysis System:** Financial institutions rely heavily on their budgeting systems for controlling costs and evaluating managerial performance. For example, an organisation can use DSS to generate monthly variance reports for each division. With the help of this system one can view, analyse, budget variances. After analysing the variances, organisation can create one-year and five-year budgets.

- d. **General DSS:** DDSs use general purpose planning languages that can analyse different types of problems. In a sense these systems act as tools to decision makers. To use this type of systems the user has to input data and answer questions about a specific problem. An example is a program called **Expert Choice**. This program supports a variety of problems requiring decisions. For example, the system may ask whether cash inflows are important or initial cash outlay is important. The decision maker also makes judgments about such questions. Expert Choice analyzes these judgments and presents the best alternative to the user.

Q.No.39. Define the term Artificial Intelligence? Write some of the applications of AI? (M05-5M, N08-10M, RTP)

Meaning: Artificial intelligence (AI) is software that tries to imitate aspects of human behavior, such as reasoning, communicating, seeing, and hearing. AI software can use its accumulated knowledge to reason and in some instances learn from experience and thereby modify its subsequent behaviour. Artificial intelligence is man made and its level of activity depends on the programming capability. It is mechanism that is not subject to human feelings like fatigue, worry, etc.

Types of AI:

- » There are several types of AI, including natural language, voice and visual recognition, robotics, neural networks and expert systems.
- » With the help of Natural language, Voice recognition and Visual recognition computers can interact with users, more easily and naturally. On the other hand Robotics can replace human labour. Both neural networks and expert systems aim to improve decision-making.

Q.No.40. Write short notes on Expert Systems? (N02) Explain various elements of expert systems. Also write its advantages and limitations? (Or) What is an expert system? Explain the various elements of an expert system. Also write its advantages? (M04 – 10M, N05, M07-5M)

An expert system (ES) is a computerized information system that allows non-experts to make decisions comparable to that of an expert. Expert systems are used for complex or unstructured tasks that require experience and specialised knowledge.

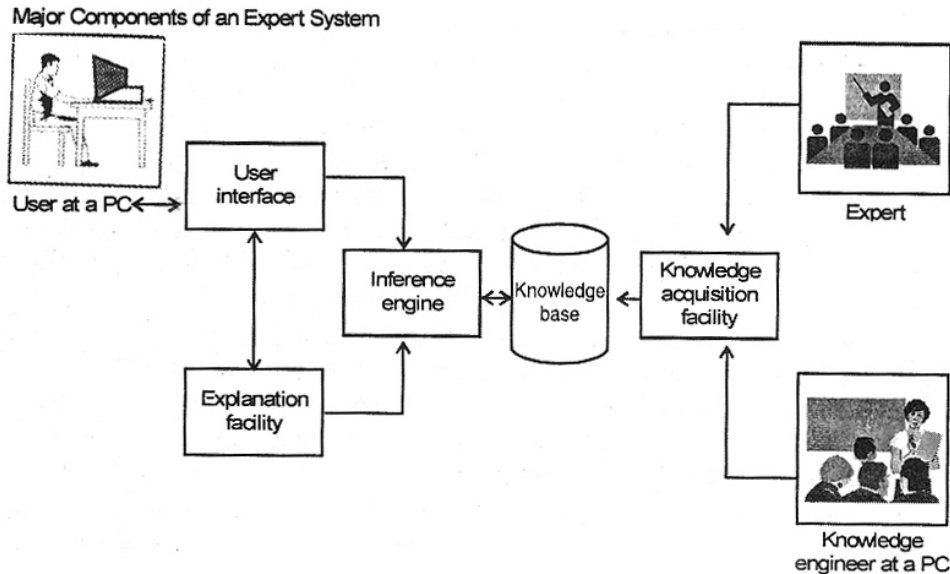
Components: Expert systems typically contain the following components:

- a. **Knowledge base:** This includes data, knowledge, relationships, rules of thumb (heuristics) and decision rules used by experts to solve a particular type of problem. A knowledge base in a computer is equal to the knowledge of an expert or group of experts developed through years of experience in their field.
- b. **Inference engine:** This program consists of logic and reasoning mechanism that can simulate ^(=replicate, reproduce) the expert's logic process and deliver advice. It uses data obtained from both knowledge base and the user to make associations and inferences, form conclusions and recommend a course of action.
- c. **User interface:** This program allows the user to design, create, update, use and communicate with the expert system.
- d. **Explanation facility:** With the help of this facility user can know the logic being followed by the expert system to arrive at the conclusion.
- e. **Knowledge acquisition facility:** Building a knowledge base, known as knowledge engineering, involves both human expert and a knowledge engineer. The knowledge engineer extracts an individual's expertise and uses the knowledge acquisition facility to enter it into knowledge base.

Advantages:

- » They provide a cost-effective alternative to human experts.
- » They can outperform a single expert because their knowledge is gained from several experts. They are faster and more consistent and do not get over worked or stressed out.
- » They produce better-quality and more consistent decisions. Expert systems assist users in identifying problems, which increases the probability of making sound decisions.

- » They can increase productivity (=i.e. production per unit of time).
- » They preserve the expertise of an expert, leaving the organisation.



Limitations:

- » Development can be costly and time-consuming. Some large systems require upto 15 years and millions of dollars to develop.
- » It is difficult to obtain knowledge from experts because it is very difficult to specify exactly how the decision maker has taken decision.
- » Designers were unable to program human being's common sense into current systems. If the system faces any situation, which is not programmed to handle, then the system may break down.

Examples:(For academic interest only): As technology advances, these problems can be overcome and expert systems will play an important role in accounting information systems. Following are examples of companies that have successfully used expert systems:

- » IRS analyzes tax returns to determine the returns to be passed to tax fraud investigators.
- » IBM designs and evaluates internal controls in both new and existing applications.
- » American Express authorizes credit card purchases to minimize fraud and credit losses. Its Expert System has replaced 700 authorization clerks and saved millions of dollars.

Q.No.41. Write about Voice Synthesizers and Voice Recognition systems?

Voice Synthesizers: (N01)

- » These are also known as voice-output devices or audio-response units or voice synthesizers.
- » They convert data stored in secondary storage devices into sounds that are understandable to human beings.
- » In these systems speed and pitch of voice can be adjusted.
- » This facility is available in many of today's applications such as children education software.
- » Voice output serves as an excellent & important media for communicating information to blind people.
- » In recent years, voice output is becoming very much popular. From the present trend of development of multi-media systems, it seems that voice output will become one of the dominant methods of output.
- » Voice synthesizers can be relatively expensive and can be easily connected to almost every computer.
- » Multimedia systems, which incorporate multi-media presentations and voice output are popular amongst consumers.



- » Voice output is produced in two ways. In the first method the computer will play stored words over a speaker. In the second method, the voice is created with special computer circuitry, a process called Speech synthesis. This circuitry is designed so that it can produce sounds like a human voice.

Voice recognition systems (M08-5M):

- » Voice Recognition Systems (VRS) can provide hands-free interaction between the computer and the user.
- » In other words, users can discard conventional input devices such as keyboard or mouse and access the computer system by simply talking to it.
- » VRS applications were originally designed for physically handicapped people. But due to the rise in RSI (Repetitive Strain Injury) claims and the desire for non-typists voice dictating applications, the demand for VRS technology is increasing.
- » Simple voice command driven applications have proved to be very effective and are extremely well received by inexperienced users. Although there are numerous applications in the market, the technology is still developing.
- » The problem is that people are irregular in their speech. Human conversation is ungrammatical, repetitive and open-ended.
- » Once the technology is perfected, it will revolutionise the use of computers.

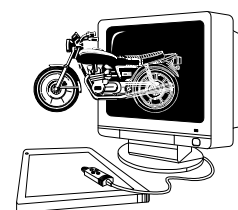
Q.No.42. Write about Neural Networks? (For academic interest only)

- » Neural networks are computing systems, developed to imitate the brain's learning process. Human brain uses massive, parallel network of interconnected neurons. Similarly Neural Networks use interconnected processors that can perform several operations simultaneously.
- » Neural networks can not handle unexpected events very well. But they are very good at recognizing patterns that humans overlook and at discovering emerging trends.
- » Like humans, neural networks learn by fine-tuning their accumulated knowledge using the facts in each new case.
- » For example, to develop a neural network that can detect fraudulent credit card transactions, it is necessary to give enough examples of both valid and fraudulent transactions until it can reliably differentiate them. Developing a large database of examples is the most difficult and costly part of developing a neural network.

Q.No.43. Write short notes on CAD and CAM. (For academic interest only) (M97, N05)

CAD: It refers to use of computers in design process.

How it helps? Computer Aided Design or Computer Aided Drafting is helpful in design process in the following way. When designing a product with a computer, engineers create electronic model of the product by describing all the three dimensions of the object. If they want to see the object from a different dimension, they just tell the computer to display another view. If they want to make any changes they need not repeat the task from the beginning as in the case of earlier days. They can just tell the computer, the changes to be made and it will automatically make the changes.



Under this system some standard shapes will be stored in secondary storage devices and they can be incorporated ^(=included) in other designs.

This technique is widely used for designing almost anything - Houses, Cars, Buildings, molecules, Space Crafts, etc.

CAM:

Meaning: Manufacturing with computers and robotics is called CAM. For e.g. factories use computerised robotic arms to do physical work, which is hazardous ^(=dangerous) or highly repetitive.

How it helps? Consider a Power Plant that generates steam for electricity. Here a computer monitors pressure and temperature at hundreds of critical points throughout the plant. If pressure or temperatures in a pipe or tank exceeds specified level, computer can regulate the process.

The End