

INFORMATION TECHNOLOGY

- THEORY (30 MARKS)
- TERMS (10 MARKS)
&
- BINARY NUMBERS & DECISION TABLE (10 MARKS)
OR
- FLOWCHARTS (10 MARKS)

SOHRAB & MOHIT

Compiled By:- Sohrab & Mohit (SAM)
Contact No :- 09076245452

SR NO	CHAPTER NAME	NO. OF QUESTIONS
1.	Introduction	8
2.	Data Base Management Systems	18
3.	Computer Networks & Network Securities	16
4.	Internet & Other Technologies	16
5.	Miscellaneous Questions	2

- Binary Numbers
- Decision Table
- Flowcharts

Chapter 1: INTRODUCTION

1. BUS AND ITS PARTS

(a) What do you understand by bus and what role does it play?

(b) Discuss various types of a bus.

- A set of wires existing on the system is motherboard.
- A bus acts as the system's expressway; it transmits data between the various components in the motherboard.
- The number of wires in the bus affects the speed as each wire transfer 1 bit at a time.
- 8 wire bus -- 8 bit bus – 1 byte at a time
--16 bit bus – 2 byte at a time
-- 32 bit bus – 4 byte at a time
- A bus is of three types:
 - Ø DATA BUS:
The data bus is used to transmit the data between the memory location and the microprocessor.
 - Ø CONTROL BUS:
The control bus is used by the microprocessor to ensure that the data is read or written to a location at the correct time.
 - Ø ADDRESS BUS:
The address bus connects the CPU and Ram and identifies the memory location it wishes to read or write to.

2. CHARACTERISTICS AND TYPES OF STORAGE

(a) What are storage devices and discuss their characteristics.

(b) Discuss various types of storage.

- The CPU contains the basic instructions needed to operate the computer, but it does not have the capability to store programs or large sets of data permanently. Computers need blocks of space to hold programs and data being manipulated.
- This area is called memory or storage.
- **(a) Characteristics of storage:**
 - Ø Addressability of information.
 - Ø Volatility of information.
 - Ø Ability to access non-contiguous information.
 - Ø Ability to change information.
 - Ø Capacity and performance
- **(b) Types of Storage:**
 - Ø Primary Storage:
Primary storage is directly connected to the central processing unit of the computer. Primary storage typically consists of three kinds of storage: Processor registers, Main memory and Cache memory.
 - Ø Secondary, Tertiary and Off-line Storage.
 - Ø Network Storage includes:
Network attached storage and Network computers.

3. MAGNETIC DISC

(a) Discuss in detail the functioning of magnetic disc.

(b) Discuss the advantages and disadvantages of magnetic disc.

(a) Magnetic Disk/Hard Disk:

- Magnetic disks also called as hard disks are the most popular direct access medium wherein a record can be accessed without having to plod through the preceding records.
- The hard disk is still the most common storage device for all computers wherein data is stored in tracks that are further divided into sectors.

Functioning of Magnetic Disk

- Ø Magnetic disks hold more data as they often include several platters stacked one on top of another.
- Ø With hard disks, the number of R/W heads specifies the number of sides that the disk uses.
- Ø The tracks vertically above and below each other constitute more or less a hollow cylinder.
- Ø The time required in accessing a record has generally three components: Seek Time, Rotational time and Data transfer time.

(b) Advantages of magnetic disk include -

- Ø Magnetic disk is direct access storage medium.
- Ø The costs of disks are steadily declining.
- Ø Records can be readily updated

Disadvantages of magnetic disk include -

- Ø Updating a master file stored on disk destroys the old information.
- Ø It is required that the read/write head must be extremely close to the surface of the disk.

In fact, the heads of hard disks fly so close to the surface of the disk that if a dust particle, a human hair, or even a fingerprint were placed on the disk it would bridge the gap between the head and the disk, causing the heads to crash.

4. INPUT/OUTPUT DEVICES

(a) Discuss DDE (Direct Data Entry), input devices like MICR, OCR and BCR their advantages and disadvantages.

(b) Discuss voice recognition and graph plotter output devices.

(a) Direct Data Entry

- Direct Data Entry refers to entry of data directly into the computer. MICR and OCR are examples of devices that enable DDE.

MICR (Magnetic Ink Character Recognition)

1. This is commonly used method for DDE.
2. MICR uses a special scanning technique to read the characters.
3. These characters can be now easily read by humans as well as MICR.
4. It involves the use of special device called the MICR for reading the characters to be input into the computer.

Advantages

- Ø MICR possesses a very high reading accuracy.
- Ø Cheques can be read both by human beings and machines.

Disadvantages

- Ø MICR has not found much favor from business.
- Ø Damaged documents, cheques not encoded with amount etc. need to be processed clerically.

OCR (Optical Character Reading)

1. This is commonly used method for DDE.
2. OCR uses a special scanning technique to read the characters.
3. These characters can be now easily read by humans as well as OCR.
4. It involves the use of special device called the OCR for reading the characters to be input into the computer.

Advantages

- Ø OCR eliminates the human effort of transcription.
- Ø Paper work explosion can be handled because OCR is economical for a high rate of input.

Disadvantages

- Ø Most optical readers are not economically feasible unless the daily volume of transactions is relatively high.

BCR (Bar Code Reader)

1. This is commonly used method for DDE.
2. BCR uses a special scanning technique to read the characters.
3. It involves the use of special device called the BCR for reading the characters to be input into the computer.
4. In the special font. Each character is composed of vertical bars. The distance between any two bars is not the same.
5. There are special bars at start and end so that the product code is read in the right order.

(b) Voice Recognition and Graph Plotter Systems

Voice Recognition:

- Ø Translating voice to text is a capability known as voice recognition, with the help of which one can speak to the computer rather than having to type.
- Ø The user can also control the computer with oral commands, such as “shut down” or “print status report”.
- Ø Voice recognition software takes the smallest individual sounds, called phonemes, and translates them into text or commands.

Graph Plotter:

- Ø A graph plotter is a device capable of tracing out graphs, designs and maps into paper and even into plastic or metal plates.
- Ø A high degree of accuracy can be achieved.
- Ø Plotters may be driven on-line or off-line.

5. DECISION SUPPORT SYSTEM (DSS)

What is a DSS? Discuss its various components.

- **DSS stands for DECISION SUPPORT SYSTEM**
- DSS are information processing systems used by accountants, managers, and auditors to assist them in the decision-making process.
- **Characteristics of Decision Support Systems:**
 - Ø Decision support system support management decision making.
 - Ø Decision support systems solve unstructured problems.
 - Ø A “friendly” computer interface is also a characteristic of a decision support system.
- **Components of a Decision Support System:** A decision support system has four basic components
(Key - DUMP)
 - i. **Databases:**

Decision support systems include one or more databases which contain both routine and non-routine data from both internal and external sources.
 - ii. **The User:**

The user of a DSS is usually a manager with an unstructured or semi-structured problem to solve.
The manager may be at any level of authority in the organization.
 - iii. **Model base:**

The planning language in a decision support system allows the user to maintain a dialogue with the model base.
The model base is the “brain” of the decision support system because it performs data manipulations.
 - iv. **Planning languages:**

Two types of planning languages that are commonly used in decision support systems are:
(1) General –purpose planning languages that allow users to perform many routine tasks and
(2) Special-purpose planning languages that are more limited in what they can do.

6. EXPERT SYSTEM

Discuss in detail Expert system.

- An expert system (ES) is a computerized information system that allows non-experts to make decisions comparable to those of an expert.
- Expert systems are used for complex tasks that require experience and specialized knowledge in narrow, specific subject areas
- Expert systems typically contain the following components:
 - a) **Knowledge base:**
This includes the data, knowledge, relationships and decision rules used by experts to solve a particular type of problem.
 - b) **Knowledge acquisition facility:**
Building a knowledge base, referred to as knowledge engineering, involves both a human expert and a knowledge engineer.
 - c) **Inference engine:**
This program contains the logic and reasoning mechanisms that simulate the expert logic process and deliver advice.
 - d) **User interface:**
This program allows the user to design, create, update, use, and communicate with the expert system.
 - e) **Explanation facility:**
This facility provides the user with an explanation of the logic the ES used to arrive at its conclusion.
- **Benefits of the Expert System**
 - Ø They provide a cost-effective alternative to human experts.
 - Ø They can increase productivity and preserve the expertise of an expert leaving the organization.
 - Ø It is faster and consistent in decision making.
- **Limitations of the Expert System**
 - Ø Development can be costly and time-consuming.
 - Ø The system can fail if not designed properly.

7. IMAGE PROCESSING

What is image processing? Discuss its advantages.

- Image Processing captures an electronic image of data so that it can be stored and shared.
- Imaging systems can capture almost anything, including handwritten documents (such as invoices or tax returns), flowcharts, drawings, and photographs.
- Many companies that use image processing are making significant progress toward paperless offices.
- There are five distinct steps to document imaging:

Ø Step 1: Data capture:

The most common means of converting paper documents into electronic images is to scan them.

Ø Step 2: Indexing:

Document images must be stored in a manner that facilitates their retrieval. Therefore, important document information, such as purchase order numbers or vendor numbers, is stored in an index.

Ø Step 3: Storage:

Because images require a large amount of storage space, they are usually stored on an optical disk.

Ø Step 4: Retrieval:

Keying in any information stored in an index can retrieve documents.

Ø Step 5: Output:

An exact replica of the original document is easily produced on the computer's monitor or on paper, or is transmitted electronically to another computer.

• Advantages of Image Processing:

- Ø **Accessibility:** Accessed and reviewed simultaneously by many people.
- Ø **Accuracy:** Costly and error-prone manual data-entry eliminated, thus accurate.
- Ø **Availability:** No lost or misfiled documents.
- Ø **Capacity:** Vast amounts of data stored in little space thus reducing storage space.
- Ø **Cost:** Voluminous data stored and processed, thus the cost per document is lowered.
- Ø **Customer satisfaction:** Waiting time reduced, customers get information in no time.

8. What do you mean by Enterprise Resource Planning (ERP)?

- ERP integrate all data and process of an organization into a single unified system.
- A typical ERP system will use multiple components of computer software and hardware to achieve the integration.
- Although the ERP originated in the manufacturing environment, today's use of the ERP systems has much broader scope.
- ERP systems typically attempt to cover all basic functions of an organization.
- Business, NPO, Governments and other large entities utilize ERP systems.
- Example Of modules in an ERP includes Manufacturing, Supply Chain, CRM, Financials etc.

Chapter 2: Data Base Management System

1. DATABASE

(a) What is a database?

Database:

- A data base is a computer file system that uses a particular **file organization**
- to facilitate **rapid updating of individual records, simultaneous updating of related records,**
- **easy access to all records by all applications programs,** and **rapid access** to all stored data
- This must be brought together for a particular routine report or inquiry or a special purpose report or inquiry.

(b) Discuss database architecture.

It follows a three level architecture –

- i) External or user view,
- ii) Conceptual or global view,
- iii) Physical or internal view.

External or user view encircles the following –

- Ø It is at the highest level of the database abstraction.
- Ø It includes only that portion of database or application programs which is of concern to the users.
- Ø It is expressed by means of a schema, called the external schema.
- Ø It is defined by the users or written by the programmers.

Global or conceptual view encompasses the following –

- Ø This includes database entities and relationships among them.
- Ø Single view represents the entire database.
- Ø It is defined by the conceptual schema.
- Ø It describes all records, relationships and boundaries.

The physical or internal view contains the following –

- Ø It is at the lowest level of database abstraction.
- Ø It is closest to the physical storage method.
- Ø It indicates how data will be stored.
- Ø It describes data structure and access methods.
- Ø It is expressed by internal schema.

(c) Discuss various types of database models.

- Various types of Database models are as follows:-

1. Distributed Database:

- Ø Distributed database are decentralized database.
- Ø When computing resources and database are scattered rather than centralized they are distributed data processing and distributed database system.
- Ø Distributed data process facilitates savings in time and costs by concurrent running of application programs and data processing at various sites.
- Ø When processing is distributed, the database needs to be distributed fully or partly.
- Ø There are two methodologies of distribution of a database - Replicated database and Partitioned database.

2. Object Oriented Database:

- Ø It is based on the concept that the world can be modeled in terms of objects and their interactions.
- Ø Objects are entities conveying some meaning to users and possess certain attributes to characterize them and interacting with each other.
- Ø For example - 'Engineer' is an object possessing attributes like 'date of birth', 'address', etc.

3. Client-server Database:

- Ø It is designed in a structure in which one system can connect to another system to ask it question or instruct it to perform job.
- Ø The system that asks the questions and issues the instructions is the client and the system answering the queries and responding to the instructions is the server.
- Ø The client machine contains the user interface logic, business logic and the database logic and the server machine contains the database.
- Ø Both are coupled with a network of high bandwidth.

4. Knowledge Database:

- Ø A database system provides functions to define, create, modify, delete and read data in a system.
- Ø The data maintained in a database system has been declarative data describing the static aspects of the real world objects and their associations.
- Ø When both the declarative and procedural data are stored in a database; it constitutes knowledge database.

2. DATA WAREHOUSE

What do you understand by “Data Warehouse”? Discuss its various components?

Data Warehouse:

- Ø A voluminous database which contains integrated data, summarized data, detailed data, historical data and metadata is called as DATA WAREHOUSE.

Components of a data warehouse:

The primary components of the majority of data warehouses are as follows:-

- **Data Source Layer:**

- Ø Data sources refer to any electronic repository of information that contains data of interest for management use or analytics.
- Ø This definition covers mainframe databases, client-server databases, PC databases, spreadsheets and any other electronic store of data.

- **Data Transformation Layer:**

- Ø The Data Transformation layer receives data from the data sources, cleans and standardizes it, and loads it into the data repository, also called staging data.
- Ø Some of the activities that occur during data transformation are - Comparing data, standardizing data, etc.

- **Data Warehouse Layer:**

- Ø The data warehouse is a relational database organized to hold information in a structure that supports reporting and analysis.

- **Reporting Layer:**

- Ø The data in the data warehouse must be available to the organization's staff if the data warehouse is to be made useful.
- Ø There are a very large number of software applications that perform this function.
- Ø Ex: - Online Analytical Processing (OLAP) Tools and Data Mining.

- **Metadata Layer:**

- Ø Metadata, or "data about data", is used to inform operators and users of the data warehouse about its status and the information held within the data warehouse.

- **Operations Layer:**

- Ø Data warehouse operations comprise the processes of loading, manipulating and extracting data from the data warehouse.
- Ø Operations also cover user management, security, capacity management and related functions.

DATA RETRIEVAL AND STORAGE

3. Describe various factors which determine the best file organization for an application. (PE – II May 2003, Nov 2006 & Nov. 2008)

Best File Organization:

The selection of best file organization for a particular application depends upon the following factors:

- **File Volatility:**

- Ø It refers to the number of additions and deletion to the file in a given period of time.
- Ø Applications which require large number of addition/deletion are called high volatile.
- Ø An ISAM file would not be a good choice in such situation.
- Ø Sequential file organization would be appropriate if there were no interrogation requirements.

- **File Activity:**

- Ø It is the proportion of master file records that are actually used or accessed in a given processing run.
- Ø At one extreme is the real-time file where each transaction is processed immediately and hence at a time only one master record is accessed. Direct access organization is best suited here.
- Ø At another extreme, for a payroll master file where almost every record is accessed when the weekly payroll is processed. A sequential master file would be more efficient in this case.

- **File Interrogation:**

- Ø It refers to the retrieval of information from a file.
- Ø If the retrieval of records must be fast, direct organization is more efficient.
- Ø If the requirements for data can be delayed, then a sequential file organization will be suited.

4. Write short note on File Management system.

(PE – II May 2007)

- **File Management System:**

- Ø In this system, different users work on their independent computers and maintain their own data files.
- Ø Each user has its own application software according to the requirements which was either developed in-house or got developed from external software agency according to the requirements.

Such system of maintaining files creates many problems as discussed below:

- **Data redundancy:**

- Ø When same data files are stored at different locations, then it is called data redundancy.
- Ø It causes problem when the data has to be updated.

- **Lack of Data integration:**

- Ø Data files of different users are not integrated with each other, therefore changes made by one user are not made in each file automatically.
- Ø It is an expensive and time consuming process for an organization.

- **Data inconsistency:**

- Ø Lack of Data integration creates data inconsistency.
- Ø When at a particular time, data stored in different files does not reconcile with each other, and then it is called data inconsistency.

- **Program-data dependence:**

- Ø Software modules being used by different users are developed in high level programming languages like BASIC, COBOL etc.
- Ø Therefore, when program written in one programming language is required to be changed in another language, then it becomes essential to change the format of data files also.

DATA BASE MANAGEMENT SYSTEMS

5. Explain Database Management Systems (DBMS). Why is it being preferred in comparison to Traditional File Processing Systems? (PE – II Nov. 2002)

- DBMS is a set of software programs that controls the organization, storage, management and retrieval of data in a database.
- The DBMS offers following distinct advantages which makes it preferable to traditional file processing systems:
- **Data sharing:**
The data from the entire company is at the disposal of users who need them.
- **Reduced data redundancy:**
A database minimizes duplication of data from file to file.
- **Improved data integrity:**
Since data redundancy is minimized, data inconsistency and the threat to data integrity are substantially reduced.
- **Improved data administration and control:**
A department devoted to the supervision of data permits better enforcement of standards for defining data elements and data relationships.

6. Describe the main functions performed by the Database Administrator.

(PE – II Nov. 2003 & May 2006)

- The database administrator is a database professional who actually creates and maintains the database, and carries out the policies developed by the data administrator.
- He performs the following main functions:
 - Ø **Physical Structure:**
DBMS maintains the physical structure of the database.
 - Ø **Updating:**
DBMS provides for updating and changing the database, including the deletion of inactive records.
 - Ø **Prevention:**
Allows only specified users to access certain paths into the database and thus prevents unauthorized access.
 - Ø **Documentation:**
Also prepares documentation which includes recording the procedures, standards, guidelines and data descriptions necessary for the efficient use of the database environment.
 - Ø **Incorporating:**
He is responsible for incorporating any enhancement into the database environment.

7. Describe briefly, why a file processing system reduces effectiveness of the end user applications OR Drawbacks of file processing? (PE-II - May 2005)

- The file processing system is still being used, but it has several problems that limit its efficiency and effectiveness for end user applications.
- These are stated below:

Ø Data Duplication:

Independent data files include a lot of duplicated data; the same data is recorded and stored in several files.

This data redundancy causes problems when data has to be updated.

Ø Lack of Data Integration:

Having data in independent files makes it difficult to provide information to end users.

Special computer programs have to be written which is difficult, time consuming and expensive for the organization.

Ø Data Dependence:

In file processing system, major components of a system i.e. the organization of files, their physical location, etc depend on one another in a significant way.

Ø Other Problems:

Data elements such as stock numbers and customer address are generally defined differently by different end users and applications.

This causes serious inconsistency in the development of programs

8. Distinguish between DDL and DML.

(PE-II Nov 2005 & Nov. 2008)

- **Data Definition Language (DDL)** is used to create a link between logical and physical structure of database file.
- Logical refers to the way the user views the data and physical refers to the way the data is stored on the storage media.
- Functions performed by DDL include the following:
 - Ø Describes the Schema and Subschema.
 - Ø Describes the field name and data type of each field.
 - Ø Indicates the key of record i.e. defines Primary, Secondary and Foreign key.
 - Ø Defines for data security restrictions.
 - Ø Provides for logical and Physical data independence.
- **Data Manipulation Language (DML)** provides the techniques for processing the data stored in database files.
- Functions performed by DML include the following:
 - Ø Provides the techniques for data manipulation such as insertion, deletion and updating of records.
 - Ø Enables the user and application programmes to process the data on logical basis rather than physical location basis.
 - Ø Enables the user and application programmers to be independent of physical data structure maintenance.
 - Ø Provides for use of record relationship which is defined using DDL.

9. Explain in brief different types of databases.

(PE-II May 2006)

- The main types of databases are discussed below:

Ø Operational data bases:

- § These data bases store detailed data needed to support the operations of the entire organization.
- § These are also called subject area data bases, transaction data bases and production data bases.

Ø Management data bases:

- § These data bases store data and information extracted from selected operational and external data base mostly needed by the top managers

Ø Information warehouse data bases:

- § It stores data from current and previous years.
- § It contains data that has been extracted from the various operational and management databases of an organization.
- § It is a central source of data.

Ø Distributed data bases:

- § These are data bases of local work groups and departments at regional offices, branch offices, manufacturing plants and other work sites.

Ø End user data bases:

- § These data bases consist of data files developed by end users at their workstations.

Ø External data bases:

- § Access to external, privately owned online data bases or data banks is available for a fee, to the end users and organizations from commercial information services.

Ø Text data bases:

- § Text data bases are natural outgrowth of the use of computers to create and store documents electronically.
- § Thus, online data base services store bibliographic information such as publications in larger text data bases.
- § They are also available on CD-ROM or optical disks.

10. What is database structure?

Explain relational database structure.

(PE–II May 2007)

- The approach used to organize records and their relationships logically, is called Database Structure.
- The three traditional data base structures are:

Ø Hierarchical database structure

- § The records are classified into hierarchy of relationships.
- § In this kind of structure, one to one & one to many relationships are possible.
- § All the records are classified into parent – child records.
- § The node on top most position is called as root record.
- § Here the entrance to the database would always be through the root record.
- § In such type of databases routine inquiries would be very easy and very fast but if some information is required partly from this hierarchy from some other hierarchy, program has to be written especially for it which is very time consuming.

Ø Network database structure

- § The main feature of such a data base is that it permits all types of relationships i.e. one to one, one to many, many to one & many to many.
- § Hence report inquiry would be much simpler.
- § These are bidirectional i.e. entry is possible through any of the ends.
- § In this, records with no explicit relationship can also be placed in middle.

Ø Relational database structure

- § In this database structures, records are stored in the form of two dimensional tables.
- § The table is a file, in which each row represents one record and each column represents a field.
- § In this database structure, relationships between the records need not to be specified in advance.
- § Relational databases provide the flexibility in performing database queries and creating reports from more than one file by establishing the relationship among them on the basis of primary key.
- § Examples of Relational Database Management Systems (RDBMS) include Oracle, IBM DB2, SQL Server, MS-Access etc.

11. Mention the advantages of DBMS.

(PE – II May 2008)

Advantages of DBMS (Database Management System) are as follows:

- **Data Sharing:**
The data from the entire company is available at one place and at the disposal of the users who need them, which helps them to analyze a large store of information.
- **Reduced Data Redundancy:**
A database minimizes duplication of data from file to file.
- **Improved Data Integrity:**
Because data redundancy is minimized, data inconsistency and the threat to data integrity are substantially reduced.
- **Data Independence:**
A database system keeps descriptions of data separate from the applications that use that data.
Thus, changes in the data definitions can occur without changing the application program that uses the data.
- **Increased Application Programmer and User productivity:**
An Application program development tool offered by DBMS improves the programmer's productivity.
The users can also increase their productivity by using query languages.
- **Improved Data Administration and Control:**
Since the responsibility of database is at one person's hand, it permits better enforcement of standards for defining data elements and data relationships.
Moreover, access to data, privacy of data, updates and deletions of data become much easier to control.
- **Increased Emphasis on Data as a Resource:**
Establishing database administration and deploying a database management system results in greater corporate attention to information systems and aids to managerial decision making and long-range planning using the database as the basic information resource.

12. Discuss various issues related to data management.

(PE – II May 2008)

(Key- A COSI CAP)

All issues regarding the effective management of data fall into at least one of the following categories:

- **Access:**
In what ways should organized users access the data in order to effectively perform their jobs? This issue involves the timing required to get data to the users when they need it, and also the issues of which users have a right to which data.
- **Content:**
What data should the organization collect in future? What data are being currently collected by the organization?
- **Organization:**
In what ways should the data be logically and physically organized to the key types of data accesses required by the users?
- **Security:**
How will data be protected from such possible events as unauthorized access, unauthorized modification, outright theft, and malicious or unintentional destruction?
- **Integrity:**
What controls are necessary in each stage of the input-processing-output-storage cycle to ensure that data are up-to-date and that changes to specific occurrences of data are made everywhere in the system?
- **Cost:**
How data-related costs should be controlled? To which sets of data and information needs should scarce resources be allocated?
- **Accuracy:**
Which validation, editing and auditing procedures are necessary in every stage of the input - processing - output cycle to ensure that data and information generated from the data are correct?
- **Privacy:**
How will data be safeguarded to protect the rights of individuals to privacy?

13. Explain the various advantages and disadvantages of direct access storage.
(PE – II Nov. 2007)

- **Advantages of direct access storage:**

- Ø Magnetic rigid disk is direct access storage (DAS) medium; therefore, individual records can be retrieved without searching through the entire file.
- Ø The costs of DAS are steadily declining.
- Ø For real-time systems where direct access is required, disks are currently the only practical means of file storage.
- Ø Records can be readily updated by writing the new information over the area where the old information was stored.
- Ø With removable disk packs, a single disk drive can store large quantities of data, although all but one of the disks is offline at any given point in time.
- Ø Interrelated files stored on magnetic disk can allow a single transaction to be processed against all of these files simultaneously.

- **Disadvantages:**

- Ø Updating a master file stored in DAS destroys the old information. Therefore, it does not provide an automatic audit trail. When disk is used, backup and audit trail require that each old master file records be copied to another medium prior to update.

14. Discuss the Various Record Relationships in Data Base?

The general types of Record Relationships that can be represented in a DB are given as under:

- **ONE TO ONE RELATIONSHIP:**
 - Ø As in a single parent record to a single child record.
 - Ø Example: - 1 student enrolled in 1 course.
- **ONE TO MANY RELATIONSHIP:**
 - Ø As in a single parent record to two or more child record.
 - Ø Example: - 1 student enrolled in 2 or more courses.
- **MANY TO ONE RELATIONSHIP:**
 - Ø As in a two or more parent record to a single child record.
 - Ø Example: - 2 students enrolled in 1 course.
- **MANY TO ONE RELATIONSHIP:**
 - Ø As in a two or more parent record to two or more child record.
 - Ø Example: - 2 students enrolled in 2 or more courses.

15. What do you mean by DATA INDEPENDENCE?

- In a database an ability to modify a schema definition at one level is done without affecting a schema in the next higher level.
- It facilitates **logical** data independence.
- It assures **physical** data independence.

16. What are the different types of DBMS USERS?

Different types of DBMS USERS are: -

- **NAIVE USERS** who are not aware of the presence of the database system.
- **ONLINE USERS** who may communicate with the database either directly through online terminal or indirectly through user interface or application programs. Usually they acquire at least some skill and experience in communicating with the database.
- **APPLICATION PROGRAMMERS** who are responsible for developing the application programs and user interface.
- **DATABASE ADMINISTRATOR** who can execute centralized control and is responsible for maintaining the database. He is most familiar with the database.

17. What is QUERY LANGUAGE? What is SQL?

- A query language is a set of commands for creating, updating and accessing data from a database.
- QUERY language allows programmers, managers and other users to ask adhoc questions to the database without the aid of programmers.

SQL

- Ø It stands for STRUCTURED QUERY LANGUAGE.
- Ø A query language which is a set of commands for creating, updating and accessing data from a database.
- Ø SQL language allows programmers, managers and other users to ask adhoc questions to the database without the aid of programmers.
- Ø It is a set of about 30 ENGLISH like command such as SELECT.....FROM...WHERE...
- Ø SQL has following features:
 - § Simple English like command
 - § Command syntax are easy
 - § Can be used by non programmers
 - § Has become standard practice for DBMS
 - § Allow users to create and update database.

18. What is DATA MINING?

- The process of recognizing pattern among data contained in data warehouse or DATA MART is called PROCESS OF DATA MINING.

- PHASES:-

- Ø **SELECTION:-**

- Selecting the data according to some criteria.

- Ex: - All those people who own a car.

- Ø **PREPROCESSING:-**

- This is a data cleansing stage where certain information is removed which is deemed unnecessary.

- Also the data is reconsidered to ensure consistent format.

- Ø **TRANSFORMATION:-**

- Here the data is not only transforms but also made useable and navigable.

- Ø **DATA MINING:-**

- This stage is concerned with the extraction of patterns from the data.

- Ø **INTERPRETATION AND EVALUATION:-**

- The patterns identified are interpreted, into knowledge which can then be used to support human decision making.

Chapter 3: Computer Networks & Network Securities

1. TRANSMISSION PROTOCOLS

(a) What do you understand by the term “Protocols”?

- **PROTOCOL:**

- Ø Protocols are a set of rules for inter-computer communication that have been agreed upon and implemented by many vendors, users and standards bodies.
- Ø Ideally, a protocols standard allows heterogeneous computers to talk to each other.

- **Network protocols** which are essentially software are sets of rules for –

- Ø Communicating timings, sequencing, formatting, and error checking for data transmission.
- Ø Providing standards for data communication.

- A protocol defines the following **three aspects of digital communication**:

- Ø **Syntax:**

The format of data being exchanged, character set used, type of error correction used, type of encoding scheme (e.g., signal levels) being used.

- Ø **Semantics:**

Type and order of messages used to ensure reliable and error free information transfer.

- Ø **Timing:**

Defines data rate selection and correct timing for various events during data transfer.

(b) Discuss OSI?

Open system Interconnection Model (OSI Model)

- **Open system Interconnection Model (OSI Model)** has been outlined by **International Organization for Standardization (ISO)** to facilitate communication of heterogeneous hardware or software platforms with each other with the help of seven layers of functions:

Ø Layer 1 or Physical Layer

§ Is a hardware layer which specifies mechanical features as well as electromagnetic features of the connection between the devices and the transmission.

§ Network topology is a part of this layer.

Ø Layer 2 or Data Link Layer

§ Is also a hardware layer which ensures reliable transfer of data through the transmission medium.

Ø Layer 3 or Network Layer

§ Makes a choice of the physical route of transmission.

Ø Layer 4 or Transport Layer

§ Ensures reliable and transparent transfer of data.

§ Multiplexing and encryption are undertaken at this layer level.

Ø Layer 5 or Session Layer

§ Establishes, maintains and terminates sessions (dialogues) between user processes.

§ Identification and authentication are undertaken at this layer level.

Ø Layer 6 or Presentation Layer

§ Controls on screen display of data, transforms data to a standard application interface.

§ Encryption, data compression can also be undertaken at this layer level.

Ø Layer 7 or Application Layer

§ Provides user services by file transfer, file sharing, etc.

§ Database concurrency and deadlock situation controls are undertaken at this layer level.

(c) Discuss TCP/IP in detail?

Transmission Control Protocol/ Internet Protocol

- The protocols used on the Internet is called TCP/IP which has two parts–
 - (i) TCP deals with exchange of sequential data.
 - (ii) IP handles packet forwarding and is used on the Internet.
- **TCP/IP has four layers–**
 - Ø The **Application Layer** provides services directly to the users such as e-mail.
 - Ø The **Transport Layer** provides end-to-end communication between applications and verifies correct packet arrival.
 - Ø The **Internet Layer** provides packet forwarding for error checking and addressing and integrity.
 - Ø The **Data Link Layer** provides an interface to the network hardware and device drivers.

(For Reference just to understand)

TCP/IP creates a packet-switching network. When a message, whether it is a file or just e-mail, is ready to be sent over the Internet, the TCP protocol breaks it up into small packets. Each packet is then given a header, which contains the destination address and is then sent individually over the Internet. The IP protocol guides the packets so that they arrive at the proper destination. Once there, the TCP protocol reassembles the packets into the original message.

2. NETWORK STRUCTURE/TOPOLOGY

(a) Define the term Network Topology.

Network Structure or Topology

- The geometrical arrangement of computer resources, remote devices, and communication facilities is known as network structure or network topology.
- A computer network is comprised of nodes and links.
- A **node** is the end point of any branch in a computer, a terminal device and a link is a communication path between two nodes.

(b) Discuss some of the basic network structures and their advantages and disadvantages.

Four basic network structures are:

Star Network:

- Ø The most common network structure or topology known as star network which is characterized by communication channels which originate from centralized computer system.
- Ø Each terminal, small computer or large main frame can communicate only with the central site and not with other nodes in the network.
- Ø If it is desired to transmit information from one node to another, it can be done only by sending the details to the central node, which in turn sends them to the destination.

• Advantages:

- Ø It is easy to add new and remove nodes.
- Ø A node failure does not bring down the entire network
- Ø It is easier to diagnose network problems through a central hub.

• Disadvantages:

- Ø If the central hub fails, the whole network ceases to function.
- Ø It costs more to cable a star configuration than other topologies (more cable is required than for a bus or ring configuration)

Bus network:

- Ø This structure is very popular for local area networks.
- Ø In this structure or topology, a single network cable runs in the building or campus and all nodes are linked along with this communication line with two endpoints called the bus or backbone.

- **Advantages:**

- Ø Reliable in very small networks
- Ø Easy to use and understand.
- Ø Requires the least amount of cable
- Ø Is easy to extend. Two cables can be easily joined with a connector, making a longer cable for more computers to join the network.

- **Disadvantages:**

- Ø Heavy network traffic can slow a bus considerably as any computer can transmit at any time.
- Ø Each connection between two cables weakens the electrical signal.

Ring network:

- Ø In this, the network cable passes from one node to another until all nodes are connected in the form of a loop or ring.
- Ø There is a direct point-to-point link between two neighboring nodes which are unidirectional and ensures that transmission by a node travels the whole ring and comes back to the node.

- **Advantages:**

- Ø Ring networks offer high performance for a small number of workstations or for larger networks where each station has a similar workload.
- Ø Ring networks can span longer distances than other types of networks.
- Ø Ring networks are easily extendable.

- **Disadvantages:**

- Ø Relatively expensive and difficult to install.
- Ø Failure of one computer on the network can affect the whole network.

Mesh network:

- Ø It is a combination of two or more network structure.
- Ø A mesh network may be fully connected or connected with only partial links.
- Ø In fully interconnected topology, each node is connected by a dedicated point to point link to every node.
- Ø In partially connected mesh topology, computer nodes are widely scattered.

- **Advantages:**

- Ø Network problems are easier to diagnose.

- **Disadvantages:**

- Ø The cost of installation and maintenance is high (more cable is required than any other configuration).

3. BUSINESS CONTINUITY PLANNING

What do you mean by Business Continuity Planning? Discuss its components in detail.

- A **Business Continuity Plan (BCP)** is a documented description of action, resources, and procedures to be followed before, during and after an event, vital to continue business operations.
- **BCP Components are –**
 - Ø Define requirements based on business needs,
 - Ø Statements of critical resources needed,
 - Ø Detailed planning on use of critical resources,
 - Ø Defined responsibilities of trained personnel,
 - Ø Written documentations and procedures cover all operations,
 - Ø Commitment to maintain plan to keep up with changes.
- **The Phase-I of a BCP** involves risk analysis in critical, vital, sensitive and non critical areas, coverage of insurance.
- **The Phase-II of BCP** involves determination of minimum resources necessary, review operations between current practices and backup procedures.
- **The Phase-III of BCP involves:**
 - Ø Hot_sites,
 - Ø Warm_sites,
 - Ø Cold_sites.
- **The Phase-IV of BCP involves –**
 - Ø Plan preparation,
 - Ø plan development and
 - Ø Developing general plan.
- **The Phase-V of BCP involves –**

Testing BCP in various phases like

 - Ø Pretest, Test, Posttest,
 - Ø Paper test, Preparedness test.
- **The Phase-VI of BCP involves –**

Maintenance by BCP Coordinator who has to arrange for scheduled and unscheduled tests, maintain records of test.

Telecommunication and Networking

4. Explain five components of Local area Network (LAN).

(PE – II Nov. 2007)

Components of a LAN: There are five components of a LAN:-

- **File Server:**
The server stores all the programs and data required by different users. It allows different users to share data and system resources namely hard disk, printer etc. There are two types of file servers:
 - Ø **Dedicated Server:** This server is only used to manage the data as well as programs and can not be used as a node, therefore, this server is called passive device.
 - Ø **Non-dedicated server:** This server can be used as a node for data entry and obtaining the results as well as server, therefore, it is called active device.
- **Workstations or Nodes:**
These computers are used by different users for data entry and obtaining the results. Nodes are connected with file server using Network Interface card and network cabling. These terminals are usually intelligent terminals which process the data after accessing the data and programs from file server. After processing, files are stored on the server for sharing by the other workstations.
- **Network Operating system:**
This operating system is used to manage different nodes as well as various I/O devices. Commonly used network operating systems are Novell Netware, Windows NT, and Sun Solaris etc.
- **Network Interface card:**
It is an electronic card which is installed in all the nodes and server to allow communication between them. Commonly used NIC in LAN is called Ethernet card which uses Linear bus topology.
- **Cabling:**
Once the server, workstations and network interface cards are in place, network cabling is used to connect everything together. The most popular type of network cable is the shielded twisted-pair, co-axial and fiber optic cabling.

5. What is a Computer network? Describe the various networking architectures.
(PE – II Nov. 2002)

- A computer network is a collection of computers and terminal devices connected together by a communication system.
- The set of computers may include large- scale computers, medium -scale computers, mini -computers and micro processors.
- The set of terminal devices may include intelligent terminals, dumb terminals, work stations and communication hardware.

- **Networking Architecture:**

- Ø The way in which individual computers, called nodes on a network interact with other computers on the network depends on how they are organized.
- Ø The scheme of organizing network is called networking architecture.
- Ø There are two basic types of architecture:

§ Client – Server:

This type of network has certain machines and devices, called servers that are specially dedicated to provide various services to other computers (called clients).

The most common type of client-server arrangement is LAN.

A client program running on one of the microcomputers can request specific data from the server.

The server program retrieves the requested data from its databases and returns it to the client.

§ Peer-to-Peer:

In peer -to -peer architecture, there are no dedicated servers.

All computers are equal, and are termed as peer.

Normally each of these machines functions both as a client and server.

The users are located in the same area and security is not a critical issue.

- o Architecture is simple in design and maintenance.
- o Network is not totally reliant on a particular computer.
- o Linking of computer in peer- to -peer is simple and straight -forward.

6. Briefly explain various types of communication services used to transmit data in a network. (PE – II Nov. 2004)

- An organization that wishes to transmit data uses one of the common services to carry the messages from station to station. Some of the common types of communication services are briefly discussed below:

Ø Narrow band Service:

It is used where data volume is relatively low; the transmission rates usually range from 45 to 3000 bits per second.

Examples of this service are telephone companies and telex service.

Ø Voice band Service

§ Voice band services use ordinary telephone lines to send data messages.

§ Transmission rates vary from 300 to 4,800 bits per second, and higher.

Ø Wide band Service:

§ It provides data transmission rates from several thousands to several million bits per second.

§ These services are limited to high-volume users.

§ Ex: - Space satellites.

Ø Communication Services:

§ It may be either leased or dial up.

§ A leased communication channel is used where there are continuing data transmission needs.

§ The dial up variety requires the person to dial the computer.

§ This alternative is appropriate when there are periodic data to be transmitted.

7. Explain the various functions of communications software.

(PE-II Nov 2005 & Nov. 2008)

Communications software manages the flow of data across a network. It performs the following functions:

- **Access control:**
Linking and disconnecting the different devices, automatically dialing and answering telephones; restricting access to authorized users; and establishing parameters such as speed, mode and direction of transmission.
- **Network management:**
Polling devices to see whether they are ready to send or receive data; queuing input and output; determining system priorities; routing messages, and logging network activity, use and errors etc.
- **Data and file transmission:**
Controlling the transfer of data, files and messages among the various devices.
- **Error detection and control:**
Ensuring that the data sent was indeed the data received.
- **Data security:**
Protecting data during transmission from unauthorized access.

8. Describe the various types of data communication modes. (PE – II Nov. 2006)

There are three different types of data communication modes:

- **Simplex:**
 - Ø A simplex communication mode permits data to flow in only one direction.
 - Ø A terminal connected to such a line is either a send-only or a receive – only device.
 - Ø Simplex mode is rarely used because a return path is generally needed
- **Half duplex:**
 - Ø In this mode, data can be transmitted back and fourth between two stations, but data can only go in one of the two directions at any given point of time.
- **Full duplex:**
 - Ø A full duplex connection can simultaneously transmit and receive data between two stations.
 - Ø It is most commonly used communication mode.
 - Ø A full duplex line is faster than half-duplex mode each time the direction of transmission is changed.

9. Describe the various services provided by a Data centre.

(PE-II May 2005 & May 2007)

Services Provided by Data Centre:

Some of the value added services that data centre provide are:

- **Database Monitoring:**
This is done via a database agent, which enables the high availability of the database through comprehensive automated management.
- **Web Monitoring:**
Assess and monitor website performance, availability, response and integrity from a visitor's perspective.
- **Backup and restore:**
Provide centralized multi-system management capabilities.
Provide comprehensive integral management solution to data storage using backup agent for the operating systems, database and applications.
- **Intrusion detection:**
Detect malicious activity on the host – based ID systems and, network-based ID systems.
Provide automated network security assessment and policy compliance evaluation.
- **Storage on demand:**
Provide back-end infrastructure as well as expertise, best practices and process to give a robust and cost-effective storage strategy.
Data storage infrastructure provides security, reliability and availability of data to meet company demands.

10. What are the constituents of a Data Centre?

(PE-II Nov. 2005)

- **Constituents of a Data Centre:**

To keep equipments running reliably, even under the worst circumstances, the data centre is built with following carefully engineered support infrastructure:

- Ø Network connectivity with various levels of physical connectivity using Fibre Optic and copper communication link and service provider redundancy.
- Ø Dual DG sets and Dual UPS,
- Ø Heating
- Ø Ventilation
- Ø Air Conditioning (HVAC) systems for temperature control.
- Ø Fire extinguishers.
- Ø Physical security systems like Security guards, Smart Card, CCTV etc.
- Ø Raised flooring to avoid flood and water logging.
- Ø Network equipments, Network Management software,
- Ø Network security by segregating the public and private network using firewalls.

11. Define Data Centre and briefly discuss features of data centers.

(PE-II May 2006 & Nov. 2006)

- A data centre is a centralized repository for the storage, management and dissemination of data and information.
- Data centre can be defined as highly secure, fault – resistant that connects to telecommunication networks.

• Features of Data Centers

Ø Size:

- § Data Centers are characterized by the size of their operations.
- § It can have hundred to several thousand servers.
- § It would require a minimum area of approx. 5000 to 30000 Sq. Meters.
- § It must have high quality construction to withstand the weight of servers to be installed inside.

Ø Data Security:

- § Data Centers have maximum data security and 100 per cent availability.
- § They are protected with the help of firewalls and password and anti - virus.

Ø Availability of data:

- § The goal of the data center is to maximize the availability of data and to minimize downtime.
- § Therefore, redundancy is built into all mission critical infrastructure of the data centre such as connectivity, electrical supply and air conditioning, surveillance and fire suppression.

Ø Electrical and Power systems:

- § Data Centers have highest power availability using Uninterrupted Power supply (UPS).

Ø Security:

- § Physical security and Data security are critical to operations.
- § Physical security of data is maintained with the help of security guards, Smart card and Closed circuits TV.

**12. Discuss the various challenges faced by management of data centre.
(PE – II Nov. 2008)**

Challenges faced by Management of Data Centre:

The management of data centre needs to face the following challenges:

- **Maintaining a skilled staff and the high infrastructure needed for daily operations:**
A company needs to have staff which is expert at network management and has software and hardware skills.
The company has to employ a large number of such people, as they have to work on rotational shifts.
- **Maximizing uptime and performance:**
While establishing sufficient redundancy and maintaining watertight security, data centers have to maintain maximum uptime and system performance.
- **Technology Selection:**
The other challenges that enterprise data centres face is technology selection, which is crucial to the operations of the facility, keeping business objectives in mind.
Another problem is compensating for obsolescence.
- **Resource Balancing:**
The enterprise needs to strike a working balance between reduced operational budgets, increased demands on existing infrastructure, maximizing availability and the periodic upgrades that today's technology demands.

13. What are the types of DATA TRANSMISSION?

Following are the types of data transmission:-

- **SERIAL TRANSMISSION**

- Ø In this approach, the bits of each byte are sent along a single path one after another serially.
- Ø Ex: - Mouse.
- Ø Advantage:- Cheap and suitable for data transmission over long distances
- Ø Disadvantage:- it is slow

- **PARALLEL TRANSMISSION**

- Ø In this approach the bits of each byte are sent simultaneously in parallel paths.
- Ø Ex:- Printer
- Ø Advantage:- it is faster
- Ø Disadvantage: - it is expensive.

- **SYNCHRONOUS TRANSMISSION**

- Ø The bits are transmitted at a fixed rate using the same clock signals between transmitter and receiver.
- Ø The bits that are placed at the start and end are known as SYNCHRONISED BITS.
- Ø Advantage:- it is faster
- Ø Disadvantage:- it is expensive.

- **ASYNCHRONOUS TRANSMISSION**

- Ø It uses a set of a start and stop bits before and after each byte of data transmitted.
- Ø Advantage:- it provides a lot of security
- Ø Disadvantage: - it is slow and not suitable for large volumes of data.

16. What are the threats and vulnerabilities of network security?

Threats and vulnerabilities of network security are as follows:-

- Fire
- Water
- Energy variation
- Structural damages
- Pollution
- Viruses and worms
- Misuse of software
- Hackers
- Intrusion like physical intrusion and eavesdropping

14. What are the benefits of CLIENT-SERVER TECHNOLOGY?

The benefits of Client-Server Technology are as follows: -

- People in the field of information systems can use client/server technology to make their job easy.
- Reduce the total cost of ownership.
- Increased productivity
- End user productivity
- Developer productivity
- Take less people to maintain a client/ server application than a mainframe
- Long term cost benefits for development and support
- Reduce the cost of purchasing, installing and upgrading software programs and application on each client's machine.

15. What are Characteristics of CLIENT/SERVER technologies?

There are 10 characteristics which are as follows:-

- Client/server architecture consists of a client process and a server process that can be distinguished from each other.
- The client portion and the server portions can operate on separate computer platforms
- Either the client platform or the server platform can be upgraded without having to upgrade the other platform.
- The server is able to service multiple clients concurrently in some client/server systems, clients can access multiple servers.
- The client/server system includes some sort of networking capability.
- A significant portion of the application logic resides at the client end.
- The database server should provide data protection and security.
- A user friendly GUI generally resides at the client end.
- Action is usually initiated at the client end, not the server end.
- A SQL capability is characteristics of the majority of client/server systems.

(Study any 7)

Chapter 4: Internet & Other Technologies

Internet and Emerging Technologies

1. Explain briefly various Disaster Recovery (DR) plans for eliminating Downtime. (PE-II May 2006)

Data centers must have proper disaster recovery systems that minimize downtime for its customers.

The different types of Disaster recovery plans (DRP) are:

- **Cold Site:**
 - Ø It is an alternative facility that is devoid (free) of any resources or equipments, except air conditioning and raised flooring.
 - Ø In this DRP, equivalent hardware is installed at Disaster site immediately but lost data cannot be restored.
- **Warm site:**
 - Ø It is an alternative facility that is only partially equipped.
 - Ø In this DRP, organization data is copied on another site in periodic intervals so that in case of disaster, data can be restored from another site but the changes made in the data by the organization between the last backup time and current time is lost.
 - Ø Therefore, after the restoration of data, updating is required in the data to make it live data.
- **Hot site:**
 - Ø It is an alternative facility that has the equipments and resources to recover business functions that are affected by a disaster.
 - Ø In this DRP, mirror image of data is stored simultaneously at the alternate site with the storage of data at current location.
 - Ø Therefore, data can be restored immediately in case of any disaster and downtime is avoided.

2. Discuss the role of Internet in the development of E-commerce.

- Electronic commerce is the process of doing business electronically. It involves the automation of a variety of business- to -business and business –to- customer transactions through reliable and secure connections.
- It is a composite of technologies, processes and business strategy that foster the instant exchange of information within and between organizations.
- It strengthens relationship with buyers, makes it easier to attract new customers, improves customer responsiveness and opens new markets on global scale.
- There are at least six reasons for the Internet's dramatic impact on the scope of E-commerce. They are:(**Key- CP RRUM**)

Ø **Cost:**

Internet costs are lower as compared to the alternative networking technologies.

Ø **Performance:**

The Internet provides its users with a high-function window to the world by handling networking tasks such as electronic mail; and visual images, audio clips.

Ø **Reach:**

The Internet is everywhere: large cities and small towns throughout the modern and developing world.

Ø **Reliability:**

Internet technology is highly robust and reliable as the design concepts for it came out of the U.S. Department of Defense.

Ø **Universality:**

Any business using the Internet can interact with any other business using the Internet.

Ø **Momentum:**

Millions of individuals are already connected to the Internet and business use is increasing at a dramatic rate.

3. Give an account of the benefits of 'Electronic Commerce' application and implementation.
(PE – II May 2008) (PE – II Nov. 2002)
(Study any 6pts.)

Benefits of E-Commerce

- **Reduced costs to buyers and suppliers by accessing on-line databases –**
Costs to buyers have reduced due to increased competition in procurement as more suppliers are able to compete in an electronically open market place. Even suppliers can electronically access on-line databases of bid opportunities, on-line abilities to submit bids, and on-line review of rewards, thereby reducing their costs.
- **Reduced time to complete business transactions –**
Since each and every transaction, from delivery to payment, can be done electronically; the time taken to complete these transactions has reduced substantially.
- **Creation of new markets through the ability to reach potential customers –**
As tens of millions of people are currently using Internet and the number is increasing day-by-day, business via Internet has opened the door to new markets and easy-to-reach potential customers.
- **Reduced errors, time and overhead costs in information processing –**
By eliminating the requirements for reentering data in processing of information, the overhead costs, errors and time has reduced.
- **Better quality of goods** as specifications are standardized and competition has increased, and improved variety of goods through expanded markets and the ability to produce customized goods exist.
- **Reduced inventories and reduction of risk of obsolete inventories –**
As the demand for goods and services is electronically linked through just-in-time inventory and integrated manufacturing techniques, the holding and ordering costs of inventories has also gone down.
- **Ability to undertake major global programs** in which the cost and personnel needed to manage a non-automated system would be unreasonable or prohibitive.
- **Improved market intelligence and strategic planning –**
Business via Internet serves as a useful tool to search for information about competitors, customers and suppliers.
This information helps in managerial decision-making and strategic planning.

- **Equal access to market for all categories of businessmen –**
The use of a public network – based infrastructure can “level the playing field” for both small and large businesses.
This allows companies of all sizes to extend their reach to a broad customer basis.
- **Reduced overhead costs through uniformity,** automation and large scale integration of management processes.
- **Reduced delivery cost –**
Especially for goods that can also be delivered electronically, the cost of delivery has reduced.
- **Reduced design and manufacturing cost –**
With the use of CAD and CAM technology, better products can be designed faster and manufactured at lower costs.
- **Reduced advertising cost –**
Products and services can now be advertised on the home pages of the organizations.
Even queries can be attended to by advising the potential customers to access the information on the web site of the organization, rather than responding them with brochures and literature.

4. What tools are available to protect the information in network against or misuse? Discuss.
(PE – II Nov. 2002, May 2005 & May 2007)

The following tools are available to protect the information in a network against intrusion or misuse:

- **Firewalls:**

Firewalls are systems that control the flow of traffic between the Internet and the firm's internal LANs and systems.

They are usually packaged as turnkey hardware/software packages and are set up to enforce the specific security policies that are desired.

- **Encryption:** Encryption allows information to transit the Internet while being protected from interception by eavesdroppers. There are two approaches to encryption:

- Ø **Hardware encryption devices** – If the Internet is being used to exchange information among branch offices, for instance, use of hardware encryption can ensure that all traffic between these offices is secure.

- Ø **Software encryption** is employed in conjunction with specific application. For example, certain electronic mail packages provide the facility of encryption and decryption for message security.

- **Message Authentication:**

It makes sure that message is really from whom it purports to be and that it has not been tampered with.

Regardless of a company's individual needs, clearly defined Internet security policies and procedures should always be part of any corporate Internet security strategy.

- **Site Blocking:**

It is a software-based approach that prohibits access to certain websites that are deemed inappropriate by management.

In addition to blocking sites, companies can also log activities and determine the amount of time spent on the Internet and identify the sites visited.

5. Explain various features offered by e-mail software.

(PE – II Nov. 2003)

Features offered by e-mail software:

Electronic mail (email) on the Internet provides quick, cost effective transfer of messages to other e-mail users worldwide.

The email software comprises of many important and useful features.

Some of them are as follows:

- **Composing messages:**

With the help of Internet Browser, it is possible to compose messages in an attractive way with the help of various fonts.

It is also possible to spell-check the message before finalizing it.

- **Replying to mails received:**

It is possible to reply to any mail received by merely using the 'Reply' facility available on the Internet Browser.

This facility also allows one to send the same reply to all the recipients of the original message.

- **Address book:**

This is an electronic form of address book wherein the following features can be saved: Name, full address, email address, organization and designation of person etc.

- **Printing of messages:** It is possible to print messages received as well as messages sent. As a result, hard copy of any message can also be kept.

- **Offline Editing / Composing/ Reading:**

Ideally, one should log on to the Internet, download all the messages on to one's own hard disk and then get disconnected from the Internet.

Once user is offline, he should read all the messages that have been received.

Even composing messages can be done offline.

This saves Internet time as well as helps in keeping the telephone line free.

- **Forwarding of messages:**

It is possible to forward any messages received from one user to another user without retyping the message.

- **Transfer of data files:**

Data files can also be sent / received to / from the client. This helps in saving of considerable amount of time, energy and money.

- **Greeting Cards:**

On the Internet, there are several sites which offer free greeting cards for thousands of occasions.

6. Explain Electronic Data Interchange (EDI) and its advantages.

(PE-II May 2003 & Nov. 2003)

- Electronic Data Interchange (EDI) is computer-to-computer communication using a standard data format to exchange business information electronically between independent organizations.
- Computer-to-computer transfer can be direct, between two companies using an agreed upon data protocol, or it can be performed by a third party, service – vendor.
- Electronic Data Interchange (EDI) is the transmission, in the standard syntax, of unambiguous information of business or strategic significance between computers of independent organizations.
- The users of EDI do not have to change their internal databases. However, this translation software has to be prepared only once.
- **The following advantages are observed for use of EDI:**
- **Issue and receive orders faster –**
Since most purchasing transactions are routine, they can be handled automatically, utilizing the staff for more demanding and less routine tasks.
- **Make sales more easily –**
Quotes, estimates, order entry and invoicing will proceed more smoothly and efficiently.
Orders received electronically ensure that information is available immediately, so that an organization can respond faster and be more competitive.
- **Get paid sooner –**
Invoices received electronically can be reconciled automatically, which means they are earmarked for payment in one's trading partner's accounting department sooner and in turn, one's own purchasing department is in a position to negotiate for better terms including faster payment.
- **Minimize capital tied up in inventory –**
For manufacturing organizations with a just- in-time strategy, the right balance is crucial but every organization stands to benefit from reducing order lead times.
- **Reduce letters and memos –**
Letters and memos do not follow rigid rules for formatting.
They can be handled by an electronic mail system.
- **Decrease enquiries –**
Customers or suppliers can make direct on-line enquiries on product availability, or other non-sensitive information instead of consuming staff's previous time.

7. Explain the chief uses of Internet.

(PE – II Nov. 2004 & Nov. 2008)

The chief uses of the Internet can be classified into three primary types namely, communication, data retrieval and data publishing.

- **Communication:**
 - Ø Communication on the Internet can be online or offline.
 - Ø When some users connect to a single server or an on-line service at the same time, they can communicate in an on-line chat.
 - Ø Alternatively, the users send e-mail to each other which can be read by the receiver at a later time. This is off-line communication.
- **Data retrieval:**
 - Ø For meaningful data retrieval, availability of data that has been compiled from various sources and put together in a usable form is an essential prerequisite.
 - Ø On the internet, a large number of databases exist.
 - Ø These have been put together by commercially run data providers as well as individuals or groups with special interest in particular areas.
- **Data publishing:**
 - Ø Data publishing is a new opportunity that Internet has made possible.
 - Ø Information that needs to be made available to others can be forwarded to specific addresses, posted in a Usenet site or kept on display in a special site.
- **Special Business Uses:**
 - § Email
 - § Online chatting
 - § Group discussion
 - § Bulletin board system
 - § Creation of websites
 - § Entertainment

8. Explain the working principle of Electronic Data Interchange (EDI).

(PE-II May 2005)

Electronic Data Interchange (EDI):

- EDI is the transmission of business information in standard format between computers of independent organizations.
 - There is no need to change the database structure by the companies for implementation of EDI.
 - However, EDI software is required to be developed for translating the format used by one organization to the format being used by other organizations.
 - So EDI is computer-to-computer communication using a standard data format to exchange business information electronically between independent organizations.
-
- **Working Principle of EDI** – EDI is the electronic exchange of business documents such as invoices, purchase orders, shipping notices etc. ED
It is a three step process:-
 - Ø First of all, sender data is converted into standard format as defined by EDI translation software.
 - Ø Data in standard format is transferred to the receiver using communication lines.
 - Ø Finally, standard format data is converted according to the format of receiver data base files.

EDI consists of three components:

§ Communication –

To make EDI work, one needs communication software, translation software and access to standards.

Communication software moves data from one point to another, flags the start and end of the document.

Translation software helps the user to build a map and shows him how the data fields from his application corresponds to the elements of EDI standards.

§ Mapping –

To build a map, the user first selects the EDI standard for the kind of data he wants to transmit.

Next, he edits out parts of the standards, which do not apply, to his application.

Next, he imports a file that defines the fields in his application, and finally he makes the map to show where the data required by the EDI standards is located in his application.

§ Profile –

The last step is to write a partner profile that tells the system where to send each transaction and how to handle errors or exceptions.

9. Explain general management concerns in E-commerce.

(PE – II May 2007)

General Management Concerns in E-Commerce are as follows:

- **Loss of Paper audit trail:**
Since no paper work is involved in doing the business transactions electronically, hence keeping the track of business activities will be difficult.
- **Business Continuity:**
In E-Commerce, all the transactions are done with the help of computers; hence if computer system fails then entire business organization will be paralyzed.
- **Exposure of data to third parties:**
Due to sharing of data among organizations, there is possibility of exposure of secret information to other parties.
- **Record retention:**
Electronic information is required to be kept safely as a statutory requirement; therefore organizations will have to take appropriate measures for the safety of data.
- **Segregation of duties:**
There are more chances of fraud in an electronic environment.
Hence, duties of various persons working in electronic environment must be properly defined, in order to fix their responsibilities at later stages.
- **Legal Liability:**
The inability to complete transactions or meet deadlines, or the risk of inadvertently exposing information of trading partners poses legal risks.

10. Explain, why Internet has dramatic impact on the scope of business applications (PE – II Nov. 2008)

Reasons for Internet's dramatic impact on the scope of business applications:

- **Universality:**
Any business using the Internet can interact with any other business using the Internet.
- **Reach:**
The Internet is everywhere; large cities and small towns throughout the modern and developing world.
- **Performance:**
The Internet provides its user with a high-function window to the world, in addition to handling everyday networking tasks such as electronic mail and visual images, audio clips and other large electronic objects.
- **Reliability:**
Internet technology is highly robust and reliable, in spite of significant differences in the extent to which various Internet service providers actually implement and ensure its reliability.
- **Cost:**
Compared with alternative networking technologies, Internet costs are very low.
- **Momentum:**
The rate of growth of Internet users is increasing manifold every year, thus business use is increasing at a dramatic rate.

11. What are the three types of E-Commerce?

- **Types of E-commerce:** There are three general classes of E-commerce applications:
 - (i) Business-to-Business (B2B)
 - (ii) Business-to-Consumer (B2C)
 - (iii) Consumer-to-Consumer (C2C)
- **Business-to-Business (B2B):**
 - Ø It is a short form of Business-to-Business, the exchange of services, information and/or products from one business to another, as opposed to between a business and a consumer.
 - Ø Business-to-Business electronic commerce (B2B) typically takes the form of automated processes between trading partners and is performed in much higher volumes than business-to-consumer (B2C) applications.
- **Business-to-Consumer (B2C):**
 - Ø It is a short form of Business-to-Consumer, the exchange of services, information and/or products from a business to a consumer, as opposed to between one business and another.
 - Ø Business-to-Consumer electronic commerce (B2C) is a form of electronic commerce in which products or services are sold from a firm to a consumer.
 - Ø Two Classifications of B2C E-Commerce are – Direct Sellers and Online Intermediaries.
 - Ø **Advantages of B2C E-Commerce**
 - § Shopping can be faster and more convenient.
 - § Offerings and prices can change instantaneously.
 - § Call centers can be integrated with the website.
 - § Broadband telecommunications will enhance the buying experience.
- **Consumer-to-Consumer (C2C):**
 - Ø Consumer-to-Consumer electronic commerce is an internet-facilitated form of commerce that has existed for the span of history in the form of barter, flea markets, swap meets, yard sales and the like.

12. What is MOBILE COMMERCE?

- It is also known as M-COMMERCE.
- It is about the explosion of application and services that are becoming accessible from internet-enabled mobile devices.
- It is quite different from traditional e-commerce.
- M-Commerce is the buying and selling of goods and services through cellular telephone and personal digital assistants (PDAs) known as next generation e-commerce.
- The emerging technology behind M commerce is WIRELESS APPLICATION PROTOCOL.
- The industries affected by M-commerce includes:-
 - Ø Financial service
 - Ø Brokerage service
 - Ø Telecommunications
 - Ø Information services

13. What is BLUETOOTH?

- Bluetooth is a telecommunications industry specification that describes how mobile phones, computers and PDAs can be easily inter connected using a short range wireless connection.
- It requires a low cost transceiver chip be included in each device.
- The transceiver transmits and receives in a previously unused frequency band of 2.45GHZ.
- Connections can be point –to-point or multi point.
- The maximum range is 10 metres.
- Data can be exchanged at a rate of 1 megabit/second.
- Built in encryption and verification is provided.
- A frequency hop scheme allows devices to communicate even in areas with a great deal of electromagnetic interference.
- The technology got its unusual name in honor of HARALD BLUETOOTH, king of DENMARK.

14. What is WIFI-WIRELESS FIDELITY?

- Wifi is also known as Wi-Fi, wifi.
- It is a brand originally licensed by the WI-FI alliance to describe the underlying technology of wireless local area networks. (WLAN).
- Wi-Fi was intended to be used for mobile computing devices, such as laptops, in LANs, access, gaming.
- There are even more standards in development that will allow to be use by cars in highways.
- When the technology was first commercialized there were many problems because consumers could not be sure that products from different vendors would work together.
- The WI-FI alliance began as a community to solve this issue.
- The Alliance created another brand Wi-Fi CERTIFIED to denote products are inter operable with other products displaying the Wi-Fi CERTIFIED brand.
- Large companies and campuses often use Wi-Fi to connect buildings.
- Wi-Fi networks also found in busy public places like coffee shops, hotels, airport lounges and other locations.

15. CUSTOMER RELATIONSHIP MANAGEMENT (CRM)

(a) What do you mean by the term “CRM” and what purpose does it serve?

- **Customer Relationship Management (CRM)** includes the methodologies, technology and capabilities that help an enterprise to manage customer relationships.
- The general purpose of CRM is to enable organizations to manage their customers in a better way through the introduction of reliable systems, processes and procedures.
- A good CRM program needs to - identify customer success factors, create a customer-based culture, adopt customer-based measures, develop an end-to-end process to serve customers, recommend what to tell a customer with a complaint about a purchase and track all aspects of selling to customers and prospects as well as customer support.
- **Purposes of Customer Relationship Management –**
A good CRM program allows a business to
 - Ø Acquire customers,
 - Ø service the customer,
 - Ø increase the value of the customer to the company,
 - Ø retain good customers
 - Ø and determine which customers can be retained or given a higher level of service.

A good CRM program can improve customer service by facilitating communication in several ways–

- Ø Provide product information, product use information, and technical assistance on web sites.
- Ø Help to identify potential problems quickly, before they occur.
- Ø Provide a user-friendly mechanism for registering customer complaints.
- Ø Provide a fast mechanism for handling problems and complaints.
- Ø Provide a fast mechanism for correcting service deficiencies.
- Ø Provide a fast mechanism for managing and scheduling maintenance, repair, and on-going support.

(b) Discuss the architecture of CRM.

There are three parts of application architecture of CRM –

1. Operational -

Operational CRM means supporting the front office business processes, which provides the following benefits – delivers personalized and efficient marketing, sales, and service through multi-channel collaboration.

2. Analytical -

In analytical CRM, data gathered within operational CRM and/or other sources are analyzed to segment customers or to identify potential to enhance client relationship.

3. Collaborative -

Collaborative CRM facilitates interactions with customers through all channels like personal, letter, fax, phone, web, email and supports co-ordination of employee teams and channels.

16. SUPPLY CHAIN MANAGEMENT

(a) What is SCM and in which areas is it applicable?

- **Supply Chain Management (SCM)** is defined as the process of planning, implementing, and controlling the operations of the supply chain with the purpose to satisfy customer requirements as efficiently as possible.
- It spans all movement and storage of raw materials, work-in-process inventory, and finished goods from point-of- origin to point-of-consumption.
- The following strategic and competitive areas can be used to their full advantage if a SCM system is properly implemented.

Ø **Fulfillment:**

Ensuring the right quantity products for sale arrive at the right time, ensuring that orders are placed with the appropriate amount of time.

Ø **Logistics:**

Keeping the cost of transporting materials as low as possible consistent with safe and reliable delivery.

Ø **Production:**

Production can run smoothly as a result of fulfillment and logistics being implemented correctly.

If the correct quantity is not ordered and delivered at the requested time, production will be halted, but having an effective supply chain management system in place will ensure that production can always run smoothly without delays due to ordering and transportation.

Ø **Revenue & profit:**

Because of SCM, a company has the ability to produce goods at lower prices and distribute them to consumers quicker than companies without supply chain management thus increasing the overall profit.

Ø **Costs:**

Keeping the cost of purchased parts and products at acceptable levels. SCM reduces costs by increasing inventory turnover.

Ø **Cooperation:**

Collaborative planning, forecasting and replenishment (CPFR) is a longer-term commitment, technological, and capacity development.

(b) Which are the problem areas in SCM? Discuss briefly.

- **Supply Chain Management problems:** SCM must address the following problems–
(Key- DIDI)
- Ø **Distribution Network Configuration:**
Number and location of suppliers, production facilities, distribution centers, warehouses and customers.
- Ø **Information:**
Integrate systems and processes through the supply chain to share valuable information, including demand signals, forecasts, inventory and transportation.
- Ø **Distribution Strategy:**
Centralized versus decentralized, direct shipment, pull or push strategies.
- Ø **Inventory Management:**
Quantity and location of inventory including raw materials, work-in-process and finished goods.

(c) What is BULLWHIP EFFECT?

- **The Bullwhip Effect:**
 - Ø The Bullwhip Effect or Whiplash Effect is phenomenon in forecast-driven distribution channels.
 - Ø Because customer demand is rarely perfectly stable, businesses must forecast demand in order to maintain inventory and other resources. Forecasts are based on statistics which are rarely perfectly accurate.
 - Ø Because forecast errors are given, companies often carry an inventory buffer called safety stock.
 - Ø Moving up the supply chain from end-consumer to raw materials supplier, each supply chain participant observes variation in demand and thus greater need for safety stock.
 - Ø In periods of rising demand, down-stream participants will increase their orders.
 - Ø In periods of falling demand, orders will fall or stop in order to reduce inventory.
- **Factors contributing to the Bullwhip Effect are –**
 - Forecast Errors,
 - Lead Time Variability,
 - Inflated Orders,
 - Price Fluctuations,
 - Batch Ordering,
 - Product Promotions.

Chapter 7: Miscellaneous Questions

1. FLOWCHARTS

What are flowcharts and their use? Discuss various categories of flowcharts.

Flowcharts:

- Ø A flowchart is defined as a diagram, prepared by the programmer, of the sequence of steps, involved in solving a problem.
- Ø A flowchart helps the programmer avoid fuzzy thinking and accidental omissions of intermediate steps.

- Flowcharts can be divided into 4 categories as below:
 - Ø System outlines charts (Global map)
 - Ø System flowcharts (National map)
 - Ø Run flowcharts (State map)
 - Ø Program flowcharts (District Map)

- **System outline charts –**
This chart merely lists the inputs, files processed and outputs without regard to any sequence whatever.

- **System flowchart-**
It is designed to present an overview of the data flow through all parts of a data processing system and represents the flow of documents.

- **Run Flowcharts –**
These are prepared from the system flowcharts and show the reference of computer operations to be performed.

- **Program flowcharts –**
The program flowcharts are the most detailed and are concerned with the logical/arithmetic operations on data within the CPU.

2. COMPUTER PROGRAMMING PROCESS

What is the concept of computer programming process? Discuss its phases.

- **Programming Process:**

- Ø Computer programming is a process which results in the development of a computer program. Computer programming is not a simple job.
- Ø It requires lot of planning and thinking.

Thus, computer-programming process may be sub-divided into six separate phases.

- **Program Analysis –**

In this stage, the programmer ascertains for a particular application the outputs required, the inputs and the processing.

- **Program Design –**

In this stage, the programmer develops the general organization of the program as it relates to the main functions to be performed.

- **Program Coding –**

The logic of the program outlined in the flowchart is converted into program statements or instructions at this stage.

- **Program Debugging –**

To debug the program, the programmers devise a set of test data transactions to test the various alternative branches in the program.

- **Program Documentation –**

Each program should be documented to diagnose any subsequent program errors, modifying or reconstructing a lost program.

- **Program Maintenance –**

The requirements of business data processing are subject to continual change. This calls for modification of the various programs.

TERMS

Digitization: The process of converting the graphical information such as lines, pictures, graphs, etc. to digital form with the help of Image scanner is called digitizing.

Bi-directional printing: Under this, a printer types the first line from left to right and the second line from right to left and so on throughout the page.

Voice synthesizer: It is also known as voice-output device. It converts data in main storage to vocalized sounds understandable to humans. Instead of producing hard copy, a synthesizer speaks the output. Presently, voice synthesizers are relatively expensive.

Smart card system: Smart cards resemble credit cards in size and shape. They contain a microprocessor chip and memory, and some include a keypad as well. Smart cards make it possible for organizations to provide new enhanced services to their customers. Smart cards are used most frequently to make electronic purchases and electronic transfer of funds between accounts

Mainframe computers: Mainframes are big general-purpose computers capable of handling all kinds of scientific and business applications. They have high speed cache memory. They also offer the facility of multi programming and time-sharing. Mainframes can process at several million instructions per second and can support more than 1000 remote terminals and have large online secondary storage capacity.

Mini computers: This type of computer performs data processing activities in the same way as the mainframe but on a smaller scale. Mini computers are also called as scaled-down mainframe. Data is usually input by means of a keyboard. Minicomputers cost about Rs. 5 lacs to Rs. 50 lacs.

Random-Access-Memory: The memory system constructed with metal-oxide semi conductor storage elements that can be changed is called Random Access Memory (RAM). The purpose of RAM is to hold programs and data while they are in use.

Read-Only-Memory: Read Only Memory (ROM) is used for micro programs. The information is stored permanently in such memory during their manufacturing and can be read only but fresh information cannot be written into it.

EEPROM: EEPROM stands for Electrically Erasable Programmable Read Only Memory. In this, the data can be erased by applying electrical charges.

EPROM: EPROM stands for Erasable Programmable Read Only Memory. EPROM chips can be electronically programmed. Unlike ROM and PROM chips, EPROM chips can be erased and reprogrammed. Eraser is performed by exposing the chip to Ultra-violet light.

CD-R: It stands for compact disc, recordable in which a person can only write once on the CD, though it can be read as many times as wished. It can be played in CD players and CD-ROM drives. Modern recording devices can also read CDs as well. CD-Rs can be created in any CD-R or CD-RW drive.

CD-RW: The rewritable compact disc is called a CD-RW which allows for repeated recordings on a disc. It is relatively more expensive than the CD-R.

Shareware: Shareware is software developed by individual and small companies that cannot afford to market their software world wide or by a company that wants to release a demonstration version of their commercial product.

Firmware: Firmware refers to a series of special program instructions. The most basic operations such as addition, multiplication etc. in a computer are carried out by hardwired circuits which are then combined in the form of micro programs called as Firmware to produce higher level operations. Firmwares are held in the CPU in a special control storage device.

Assemblers: Assemblers are used exclusively with assembly languages. They work similarly to compilers, translating an assembly language program into object code. Because assembly language programs are usually more machine efficient than those written in high-level languages, a two-step translation process may take place.

Byte: A byte is a basic group grouping of bits (binary digits). It consists of 8 bits and is used to represent a character by the ASCII and EBCDIC coding systems.

Word: A word is a grouping of bits (usually larger than a byte) that is transferred as a unit between primary storage and the registers of the ALU and control unit.

Primary Key: The primary key of any table is any candidate key of that table which the database designer arbitrarily designates as primary. The primary key may be selected for convenience, performance, or any other reasons.

Secondary Key: Secondary keys can be defined for each table to optimize the data access that can refer to any column combination. A candidate key which is not selected key is known as Secondary key.

Integer Fields – The integer field accepts data as a whole number.

Text Fields – The text field accepts data as an alpha-numeric text string.

Transaction Log: A transaction log is a file that records database modifications like Inserts, updates, deletes, etc.

Mirror Log: A mirror log is an optional file and has a file extension of .mlg. It is a copy of a transaction log and provides additional protection against the loss of data in the event the transaction log becomes unusable.

Proxy Server: A proxy server is designed to restrict access to information on the Internet. A proxy server operates on a list of rules given to it by a System Administrator. If certain keywords are found in the requested page, access to it is denied by the proxy server.

Online Backup: An online database backup is performed by executing the command-line or from the Backup Database utility. When an online backup process begins, the database engine externalizes all cached data pages kept in memory to the database file(s) on disk. This process is called a checkpoint.

Drag: It refers to the activity of moving something around the monitor with the help of mouse. Dragging involves holding down one of the mouse buttons while the user moves it.

Live Backup: A live backup is carried out by using the BACKUP utility with the command-line option and provides a redundant copy of the transaction log for restart of the system on a secondary machine in the event the primary database server machine becomes unusable.

ASCII Code: It stands for ASCII Code: It stands for American Standard Code for Information Interchange. It uses the right most 7 bits of the 8 bits to represent numbers, letters and special characters.

BIOS: BIOS stands for Basic Input Output System. It is the small chip on the motherboard that includes start up code, the set up programs, etc.

Accumulator: It refers to storage area in memory used to accumulate totals of units or total of amounts being computed.

CMOS (Complementary Metal Oxide Semiconductor): Personal computer uses the CMOS memory to store the date, time and system setup parameters. It is powered by lithium ion battery.

PCI Slots (Peripheral Component Interface): It is used for connecting PCI based devices like sound cards, internal modems, etc.

Cursor: A symbol that marks the current position of the mouse on the screen is referred to as cursor.

Architecture: It means the construction and organization of the hardware components of a computer.

Micro-computers: A micro computer is a full-fledged computer system that uses a microprocessor as its CPU. These are also called personal computers. Micro computer can run on DOS, WINDOWS, and WINDOWS NT OS.

PROM: It stands for Programmable read only memory. It is one sort of ROM which can be programmed as per user requirements. It is non-volatile. The chip can be programmed once and then it cannot be altered.

Semi conductor memory: It is made up of every thin silicon chip which contains a number of small storage cells that can hold data.

Clock speed: The clock speed is the speed at which the processor executes instructions. Clock speed is measured in MHZ (Megahertz).

Cache Memory: Cache means hidden. Instead of having a separate RAM chip, many processors have their own memory which is called as Cache (L1 type cache). It is used to store data that is frequently required or within the next few instruction cycles.

Application software: Application software comprises of special programs for particular application and for solving a particular problem. E.g. TALLY.

Multitasking: Multitasking refers to two or more tasks performed in main memory and executed them concurrently on single user computer.

Multiprocessing: Multiprocessing is used to describe a system whereby two or more interconnect CPU's perform programs simultaneously. It is also called "Parallel Processing" since programs are executed simultaneously.

Multiprogramming: Multiprogramming means interleaved execution of two or more different and independent programs by the same computer.

DBMS: It refers to Database Management System. It is a set of software programs that controls the organization, storage, management and retrieval of data in a database. A database is a repository for related collection of data.

Word Processor: Word processor is a computer application used for production including editing and formatting any printable material. Microsoft word is widely used computer word processing system.

VPN: It refers to Virtual Private Network. It is a private network which uses public network to connect to connect remote sites or users together.

2 types of VPN:

Virtual Private Dial-up Network (VPDN)

Site – to – Site VPN.

IDS: The goal of intrusion detection is used to monitor network assets and to detect anomalous behaviour and misuse.

The primary IDS components are:

Network Intrusion Detection (NID)

Host – based Intrusion Detection (HID)

Hybrid Intrusion Detection

Network Node Intrusion Detection (NNID)

Index Fields: Index fields are used to store relevant information along with a document. The data input in an index field is used to find those documents when needed.

3 types:

Standard

Drop down and look up list

Auto – complete history list.

Flash Memory: Flash Memory chip is one of the latest storage devices which are used to store data. It is Non – volatile and very fast.

Bubble Memory: Bubble Memory is composed of small magnetic domains called Bubbles. The presence or absence of bubbles is used to indicate whether a bit is 'on' or 'off'. Bubble Memory has high potential because it has low production cost.

MMX: MMX stands for Multimedia Extensions. It is set of instructions built into the CPU for improving the performance of multimedia and graphic applications mainly games.

Motherboard/ System Board: It is the main circuit board on the computer. It acts as a direct channel for the various components to interact and communicate with each other.

FAT: File Allocation Table. FAT is a log that records the location of each file and status of each sector.

BOOT Record: It is a small program that runs when the computer is started and determines whether the disks contains basic components of Windows or DOS that are necessary to run operating system successfully.

Decision Table: A decision table is a table that may accompany flowchart defining the possible contingencies that may be considered within the program and the appropriate course of action for each contingency.

Decision Table is divided into 4 parts:

- Condition Stub
- Action Stub
- Condition Entries
- Action Entries.

EBCDIC Code: Extended Binary Coded Decimal Integrated Code. It is used in mainframes. Here, each byte is divided in two portions; left of the 4 bits known as ZONE portion and right of the 4 bits is known as DIGIT portion.

Debug: Errors in a programme is called a bug and the process of finding and rectifying the errors is called DEBUG.

Transaction Server (TS): It is a service that is all about managing the way applications uses components and not just about managing transactions. TS is an integral part of Windows NT.

Sort utilities (SU): Sort utilities are often found in mainframe and minicomputer environment are used to sort data. SU are commonly found in spreadsheets and DBMS.

Spooling software: The purpose of spooling software is to compensate the speed differences between computer and its peripheral devices.

ISDN: Integrated Services Digital Network. It is a system of digital phone connections that allows simultaneous transmission of voice and data across the world.

Workstations: Workstations are like personal computers and are used by one person. Workstations are more powerful than personal computers and are based on RISC. Workstation generally runs on UNIX OS.

System Software: System Software comprises of programming languages, operating systems and any other programs that control and supports application software.

GUI: Graphical User Interface. Now, trend has changed from Command Driven Interface to GUI. GUI has efficiently eliminated the need for users to remember and enter cumbersome commands. In today's world all soft wares are based on GUI.

Cooling Fan: The CPU generates lot of heat when in operation. Thus, the processor is usually covered by a heat sink and a small cooling fan to clear away the heat generated by the CPU.

Video RAM (VRAM): It is used to accelerate the display of graphics on the screen.

Intelligent terminal

It has a storage area for storing data, results.

It is user programmable.

It is a device that provides for input, processing and output.

Dumb terminal

It does not have a storage area for storing data, results.

It is NOT user programmable.

It is an input output device that provides for data entry and information exit when connected to computer.

CD- ROM DISKS: It stands for Compact Disc Read Only Memory. It has high storage capacity (i.e. over 650 MB)

CD- REWRITABLES: The CD – ROM is a write once medium only. CD-REWRITABLES are a step ahead of CD – ROMS. CD- REWRITABLES drive can be internal or external. It provides business and home users with up to 850 MB of rewritable, removing capacity.

Worm disks: It stands for Write Once Read Many Optical laser disks. It offers a storage capacity of up to 200 MB.

	CPU	
ALU	CU	MU
Arithmetic and Logic Unit	Control Unit	Memory Unit
All calculations and decision – making are performed by this unit.	The CU controls and supervises the entire operations of the computer.	MU of computer uses devices to store the data. E.g. RAM chips
It receives raw data from RAM; therefore, processing in ALU and processing is done, the data is returned to RAM.	It controls the movement - of data from primary storage to ALU and vice – versa.	

DIGITAL VIDEO DISKS (DVD) / DIGITAL VERSATILE DISC: CD's are soon taking a new direction with the advent of DVD, which has excellent storage capacity. DVD can store text, video and audio data.

Dynamic RAM

Slower.
Cheaper.

High density.

It is capacitors based which go ON and OFF continuously which is a reason why the cells lose their charge.

Static RAM

Faster.
Expensive.

Low density.

It is switch based; so the cell do not lose the charge till switch is ON

Magneto Optical Disk Drive: Popularly known as zip disks and drives and can vary in storage capacity from 100 MB to 4 GB. It is very expensive and NOT so reliable.

Non – Impact printers: These noise less and offer better quality outputs. They are expensive. Non – Impact printers employ processes other than hammers to form characters on a page.

COM (Computer output on microfilm/microfiche): It is an output technique that records output from computer as microscopic images on a roll or sheet of film. Microfilm and microfiche are created on a continuous negative film but have certain differences:-

Microfilm is in continuous form whereas Microfiche is cut into pieces.

Microfilm needs to be read sequentially and microfiche provides random access.

Advantages of COM:

It weights much lesser.

Cost for recording data is lesser.

Less space is required to store microfilm than printed materials.

Thermal

It is a type of Non – impact printers.

Mainly used for printing Bar codes and product labels, cheques and MICS forms.

-

Inkjet

It is a type of Non – impact printers.

Noiseless; ink cost is very high and provide laser like quality at low cost.

Print 1 to 3 pages per minute.

Laser

It is a type of Non – impact printers.

Noiseless; Expensive.

Print 4 to 17 pages per minute.

BOOT STRAP LOADER: - When a computer is first turned on or restarted, bootstrap loader is executed. This bootstrap loads the first program to be run by the computer – usually an operating system.

Need of hub in a network: A hub is a hardware device that provides a common wiring point in a LAN. Each node is connected to the hub by means of simple twisted pair wires.

NEED OF DIAGNOSTIC ROUTINE IN SYSTEM SOFTWARE: - These programs are written and provided by computer manufactures. These assist in tracing the processing of the program being debugged.

USE OF SUBROUTINE: - It is a small independent program which is included in the main program to perform a specific function again and again with different values of data.

Object – oriented language/ programming (OOP):

An object is a pre – defined set of program codes that after having being written and tested will always behave the same way so that it can be used for other applications.

In OOP, objects are selected by pointing to a representative icon; small amount of code necessary for finishing the program is written and then linking these objects together creates a new program. Object oriented language consists of various objects are also called classes.

Advantages:

Ease of use.

Programs produced are more reliable.

Allows GUI.

When an object is updated, all programs using that object are updated automatically.

Disadvantages:

Initial cost is very high.

Time consuming

Large programs produced by OOP's are slower.

Data Independence: Database system keeps description of data separate from applications that use the data. Thus, changes in the data definition can occur without necessarily requiring changes in every application programs that uses the data. The result could be substantial reduction in program maintenance cost i.e. the cost to upgrade application program in response to changes in the file structure.

USE OF OPERATING SYSTEM: - It is system software which acts as an interface between the user and the computer system.

Language Translators

Compilers

It is a computer program whose purpose is to translate the high level language statements into computer readable language i.e. The machine language.

Occupies more storage

Slower

Expensive

Eg:- COBOL, PASCAL

Interpreters

It is a computer program whose purpose is to translate the high level language statements into computer readable language i.e. The machine language.

Occupies less storage

Faster

Cheaper

Eg:-BASIC INTERPRETER

Gateways: It is used to connect two dissimilar networks but do not possess network management facilities. They are used to connect LANs of different topologies e.g. Bus and Ring Network.

Use of File Pointer: File pointers establish linkage between records and are a basic part of the file organization of all the database models except the relational model. A pointer is the address of another related record that is "pointed to". The pointer directs the computer to that related record. It is placed in the last field of a record, if more than one pointer is used, then in the last fields.

Routers: Routers are hardware devices used to direct messages across a network. They also help to administer the data flow by such means as redirecting data traffic to various peripheral devices or other computers by selecting appropriate routes in the event of possible network malfunctions or excessive use.

Bandwidth: Bandwidth represents the difference between the highest and lowest frequencies that can be used to transmit data. In other words, it refers to a channel's information carrying capacity. It is usually measured in bits per second (bps).

Multiplexer: This device enables several devices to share one communicator line. It scans each device to collect and transmit data on a single line to the CPU. It also communicates transmission from the CPU to the appropriate terminal linked to the multiplexer.

Use of Gateway in computer network: Gateways are usually used to link LANs of different topologies.

Domain Name: It refers to the unique name that identifies an internet site. Domain name always have two or more parts, separated by dots. The part on the left is the most specific and the part on the right is most general. A given machine may have more than one domain name but a given domain name points to only one machine. E.g. icai.org; exam.icai.org.

Need of Modem in data communication: Modems are required to tele-communicate computer data with ordinary telephone lines because computer data is in digital form but telephone lines are analog.

Need of Repeaters in the network – Repeaters are devices that solve the snag of signal degradation which results as data is transmitted along the cables.

Need of Protocol Converters: Protocols are the standard set of rules which govern the flow of data on a communication network. To enable diverse system components to communicate with one another and to operate as functional unit, protocol conversion is needed. It can be accomplished via hardware, software, or a combination of hardware and software.

Use of Bridges in the Network: The main task of a bridge computer is to receive and pass data from one LAN to another. In order to transmit this data successfully, the bridge magnifies the data transmission signals. It can act as a repeater as well as a link.

Use of Router: Router is a special purpose computer or software package that handles the connection between two or more networks. Routers spend all their time looking at the destination addresses of the packets passing through them and deciding on which route the packets should be sent.

Protocol translator: It is a peripheral device which converts the communication protocol of one system into the protocol of another system so that the two systems are compatible enabling data to be transferred between them.

Communication Channel: A communication channel is the medium that connects the sender and receiver in the data communication network. Common communication channel include telephone lines, satellite, etc.

FTP: FTP refers to File Transfer protocol. It is a common method of moving files between two Internet sites. There are many publicly accessible sites from where information can be obtained using FTP.

Uniform Resource Locators: Uniform Resource Locators are used by Web Browsers to address and access individual web pages, web sites and Internet resources. The format of a URL is as given below:

Example: <http://www.icai.org/seminars.html>

Secure System: It refers to a system in which the computer hardware, software and procedures are:

Reasonably secure from unauthorized access and misuse.

Provide a reasonable level of reliability and correct operation.

Reasonably performing the intended functions.

Web browser: A special client software package which is used to review web pages on Internet is called web browser. Netscape and Internet Explorer are commonly used web browsers.

PPP (Point-to-Point Protocol) – It is most well known protocol that allows a computer to use a regular telephone line and a modem to make TCP/IP Internet connection and thus be really on the Internet.

HTML (Hypertext Markup Language): This coding language is used to create Hypertext documents for use on the World Wide Web. It allows the creator of the web page to specify how text will be displayed and how to link it to other web pages, files and Internet services.

Internet Service Provider (ISP): An institution that provides access to the Internet subscriber on a charge basis is referred to as Internet Service Provider. For example, in India VSNL (Videsh Sanchar Nigam Limited) is one of the Internet Service Providers.

Extranet: An **extranet** is an extension of an Intranet that makes the latter accessible to outside companies or individuals with or without an intranet. It is also defined as a collaborative Internet connection with other companies and business partners. Parts of an intranet are made available to customers or business partners for specific applications. The extranet is thus an extended intranet.

Data Centre: A data centre is a centralized repository for the storage, management and dissemination of data and information. Data centre can be defined as highly secure, fault – resistant that connects to telecommunication networks.

PROBLEMS BASED ON FLOWCHARTING

Question 1

An insurance company follows the following rules:

- (i) If a person's health is good and age is between 20 and 40 years and lives in a city and sex is male, then the premium is Rs.20 per thousand and he will be insured for maximum amount of Rs.10.0 lakhs.*
- (ii) If a person satisfies all the above conditions, except that sex is female, then the premium is Rs.15 per thousand and maximum insured sum will be Rs.15.0 lakhs.*
- (iii) If a person's health is poor and age is between 20 and 40 years, but lives in a village. For a male sex, premium is Rs.50 per thousand and maximum insured sum is Rs.1.0 lakh only.*
- (iv) In all other cases, the person is not to be insured.*

Draw a flow chart to find the eligibility of a person to be insured, premium rate and maximum amount of Insurance.

(PE – II Nov. 2002)

Question 2

An electricity distribution company has three categories of consumers namely-

- (i) Domestic*
- (ii) Commercial*
- (iii) Industry*

The charges of electricity per unit consumed by these consumers are Rs.3, Rs.4 and Rs.5 respectively. The computer database of the company has following information:

- Consumer's name*
- Category*
- Units consumed*
- Bill date*
 - Date of payment.*
 - The company processes bills according to the following criterion.*

If the consumer is domestic and pays his bill within 10 days of the bill date, 5% discount is given. If he pays the bill within 15 days, no discount is given. If he makes the payment after 15 days of the bill date, 10% surcharge is levied. For the non-domestic consumers (commercial or industry), corresponding percentage be 10%, 0% and 15% respectively.

Draw a flowchart to calculate the bill amount, discount, surcharge and net amount of the bill for each type of consumer and print it.

(PE – II May 2003)

Question 3

A bank accepts fixed deposit for a year or more and the policy on interest rate is as follows:

- (i) If a deposit is less than Rs.10, 000 and for two or more years, the interest rate is 5% compounded annually.*
- (ii) If a deposit is Rs.10, 000 or more, but less than Rs.50, 000 and for two or more years, the interest rate is 7% compounded annually.*
- (iii) If the deposit is Rs.50, 000 or more and is for one year or more the interest rate is 8% compounded annually.*
- (iv) On all deposits for five years or more interest rate is 10% compounded annually.*
- (v) On all other deposits not covered by the above conditions, the interest rate is 3%.*
- (vi) If the customer is holder of any type of account for last five years, an additional 1% interest is allowed.*

Draw a flow chart to obtain the money in customer's account and interest credited at the time of withdrawal.

(PE – II Nov. 2003)

Question 4

Draw a flow chart to compute and print Income-tax, Surcharge and Education Cess on the income of a person, where income is to be read from terminal and tax is to be calculated as per the following rates:

	Slab (Rs.)	Rate
(i)	1 to 1,00,000	No tax
(ii)	1,00,001 to 1,50,000	@ 10% of amount above 1,00,000
(iii)	1,50,001 to 2,50,000	Rs. 5,000 + 20% of amount above 1,50,000
(iv)	2,50,001 onwards	Rs. 25,000 + 30% of amount above 2,50,000
	Surcharge	@ 10% on the amount of total tax, if the income of a person exceeds Rs. 10,00,000
	Education Cess	2% on the total tax

(PE – II Nov. 2006)

Question 5

A company ABC Ltd. is engaged in selling consumer goods to different categories of customers. In order to increase its sales, different types of discounts are offered to customers. The policy of discount is as given below:

- (i) On cooking range, a discount of 12 percent is allowed to dealers and 9 percent to retailers irrespective of the value of the order.*
- (ii) A discount of 12 percent is allowed on washing machine irrespective of the category of customer and the value of the order.*
- (iii) On decorative products, dealers are allowed a discount of 20 percent provided that the value of the order is Rs. 10,000 and above. Retailers are allowed a discount of 10 percent irrespective of the value of the order.*

Draw a flow chart to calculate the discount for the above policy.

(PE – II May 2004)

Question 6

A bicycle shop in a city hires bicycles by the day at different rates for different models as given below:

Model No.	Hire rate per day
Model No. 1	Rs. 10
Model No. 2	Rs. 9
Model No. 3	Rs. 8
Model No. 4	Rs. 7

In order to attract customers, the shopkeeper gives a discount of 15 percent to all those customers, who hire a bicycle for more than one-week period. Further to attract women customer, he gives additional discount of 10 percent irrespective of hire period. For every bicycle hired a security deposit of Rs. 25 must be paid.

Draw a flow chart to print out the details of each customer such as name of customer, bicycle model number, number of days a bicycle is hired for, hire charges, discount and total charges including deposits.

(PE – II Nov. 2004)

Question 7

An electric supply company charges the following rates for its domestic consumers:

No. of units consumed	Charges/unit (Rs.)
For the first 200 units	1.60
For the next 300 units	2.10
Over 500 units	3.90

Surcharge @ 20% of the bill is to be added to the charges.

Draw a Flow chart for the above, which will read the consumer number and the number of units consumed and print out the total charges with the consumer number and the units consumed.

(PE – II Nov. 2006)

Question 8

A bank has 500 employees. The salary paid to each employee is sum of his basic pay, Dearness Allowance and House rent allowance. For the purpose of computing house rent allowance bank has classified his employees into three classes A, B and C. The house rent allowance for each class is computed at the rate of 30 percent, 20 percent and 10 percent of the basic pay respectively. The dearness allowance is computed at a flat rate of 60 percent of the basic pay.

Draw a flow chart to determine the percentage of employee falling in the each of the following salary slabs:

- (i) Above Rs. 30,000
- (ii) Rs. 15,001 to Rs. 30,000
- (iii) Rs. 8,001 to Rs. 15,000
- (iv) Less than or equal to Rs. 8,000.

(PE – II May 2005)

Question 9

A water distribution company has two categories of consumers (Domestic and Commercial).

The charges of water per unit consumed by these consumers are Rs. 5.00 and Rs. 8.00 respectively. The computer database of the company has the following information:

- Consumer's name
- Category
- Units consumed
- Bill's date
- Date of payment.

The company processes bills according to the following criterion:

If the consumer is domestic and pays his bill within 10 days of the bill date, 7% discount is given. If he pays the bill within 15 days, no discount is given. If he makes the payment after 15 days of the bill date, 10% surcharge is levied. For commercial consumers, corresponding percentage be 15%, 0% and 15% respectively. Draw a Flow chart to calculate the bill amount, discount, surcharge and net amount of the bill for each type of consumer and print it.

(PE – II Nov. 2005)

Question 10

A company offers discounts to customers on the following basis:

<i>Quantity ordered</i>	<i>Normal discount</i>
<i>Less than 101</i>	<i>5%</i>
<i>From 101 to 500</i>	<i>10%</i>
<i>From 501 to 1,000</i>	<i>15%</i>
<i>More than 1,000</i>	<i>20%</i>

The normal discount as given above is admissible only if the Customer's account balance is below Rs. 1,000 and the order value is Rs. 10,000 or more. If the account does not satisfy both of these conditions, the discount is reduced by 2% and if only one condition is violated, the discount is reduced by 1%.

Draw a Flow Chart to print customer name, discount offered and net amount payable for 25 customers.

(PE – II May 2007)

Question 11

A computer file contains the customer name, type, bill number, bill date, amount and date of payment. The bill is generated according to the following rules:

If a customer is a dealer and pays his bill within 15 days, 5% discount is allowed. If he pays the bill between 15 and 30 days, the discount allowed is 2%. If payment period is more than 30 days but upto 60 days, 5% surcharge is levied. For payment after 60 days, 10% surcharge has to be paid.

If a customer is a manufacturer, the corresponding percentages are 7%, 5%, 7% and 12% respectively.

Draw a program flowchart to calculate discount, surcharge and net amount for each of the 20 customers. Also print total discount and surcharge paid by all the customers.

(PE – II Nov. 2007)

Question 12

There are total 6,000 students in a university having four different disciplines. Their discipline code and yearly tuition fee per student, details are as follows:

Discipline of student	Code	Yearly tuition fee
Medical	M	80,000
Engineering	E	60,000
Science	S	40,000
Arts	A	25,000

Draw a flowchart to read the name, discipline code of the student's from the terminal/file. Find the total yearly revenue earned and the number of students discipline wise. Also find the percentage of contribution to the total revenue from each discipline of students.

Print the total revenue collected and the number of students, the percentage of their contribution discipline wise to the total revenue earned by the university.
(PE – II May 2008)

Question 13

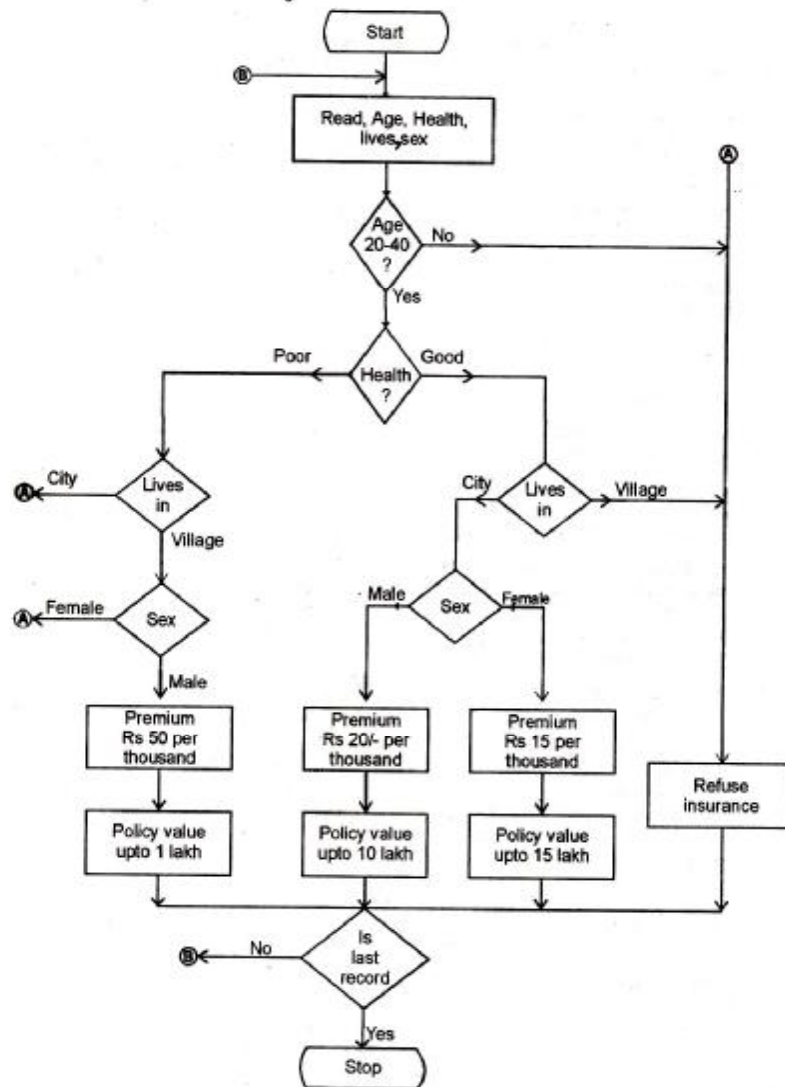
The goods imported from the foreign countries are classified into four categories for the purpose of levying Custom duty. The rate of Custom duty on value of goods 'V' for each category is given below:

Category (K)	Type of Goods	Custom Duty (%)
1.	Electronic items	10
2.	Heavy machinery	15
3.	Footwear items	20
4.	All other unclassified items	25

Draw a flow chart to compute appropriate custom duty including educational Cess at the rate of 3% of the value of custom duty. (PE – II Nov. 2008)

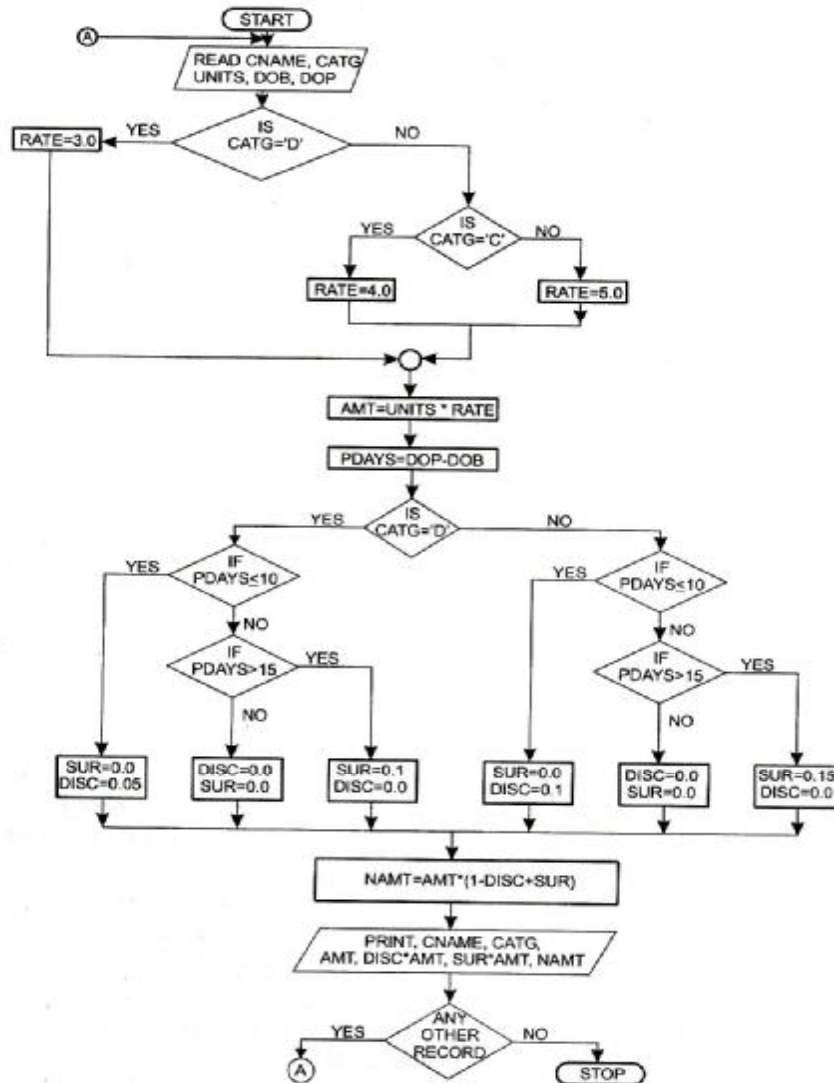
Answer of question 1

The required flowchart is given below:



Answer of question 2

Flowchart is given below:



CNAME – Consumer Name

NAMT – Net Amount

CATG – Category

DOB – Date of bill

DOP – Date of payment

PDAYS – Difference between DOP & DOB

DISC – Discount

SUR – Surcharge

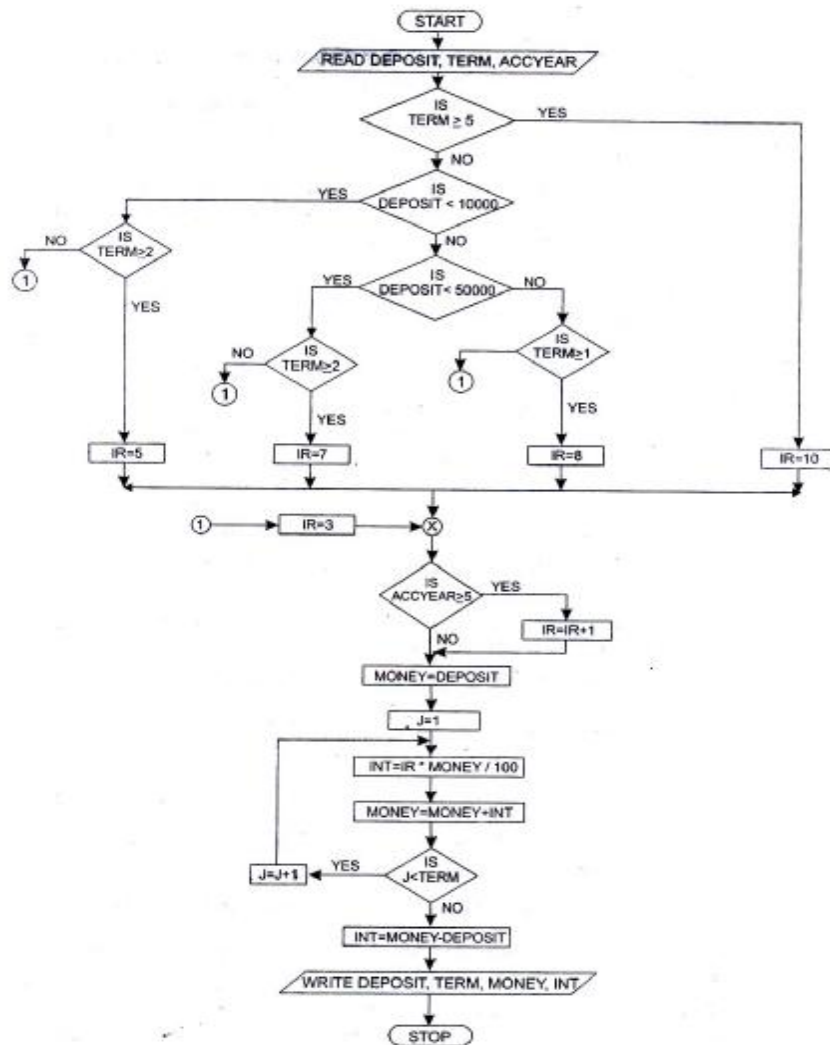
D - Domestic

C - Commercial

Amt - Amount

Answer of question 3

The flowchart is given below:

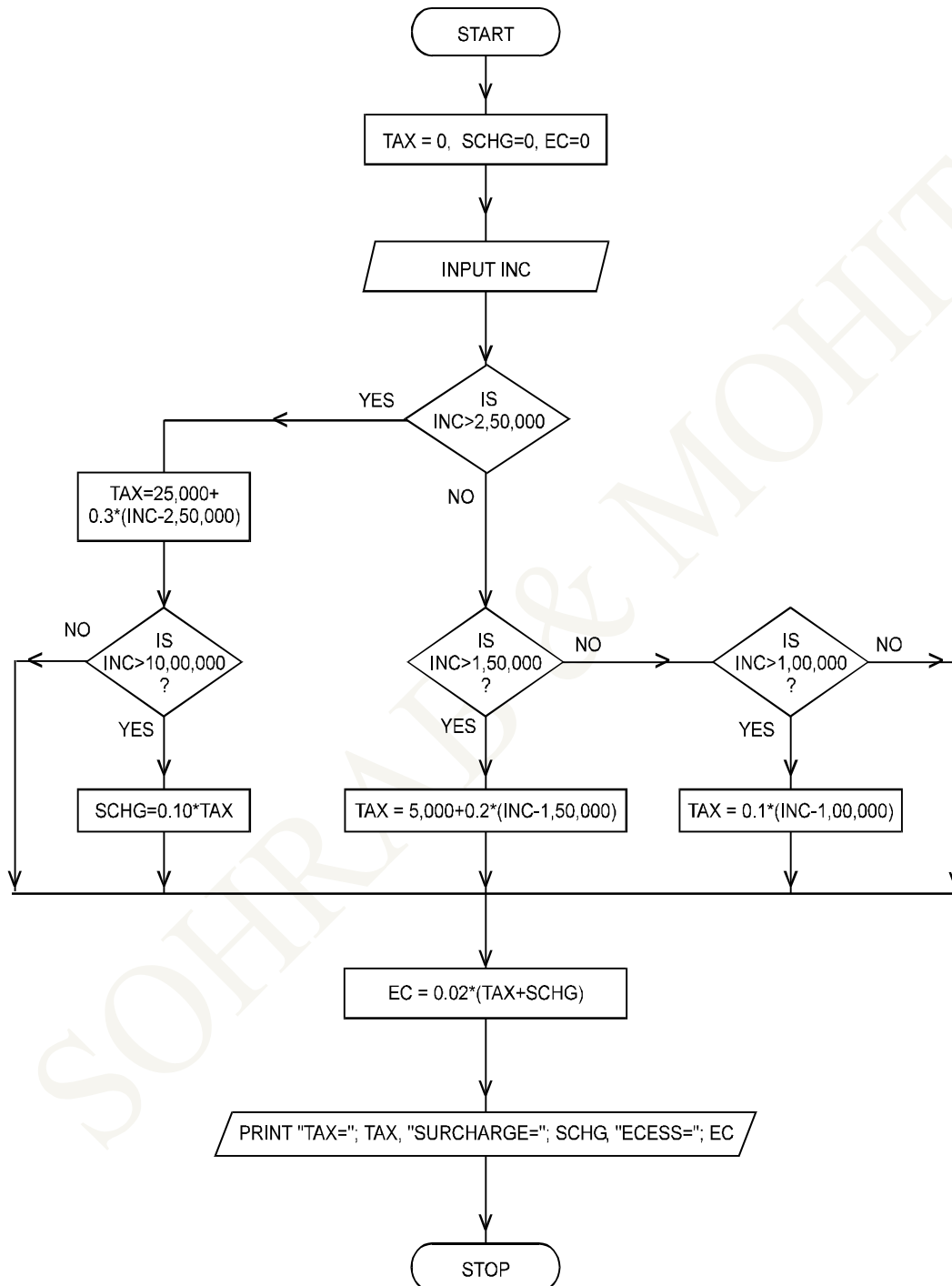


IR – Interest Rate

INT - Interest

Answer of question 4

The flowchart is given below:



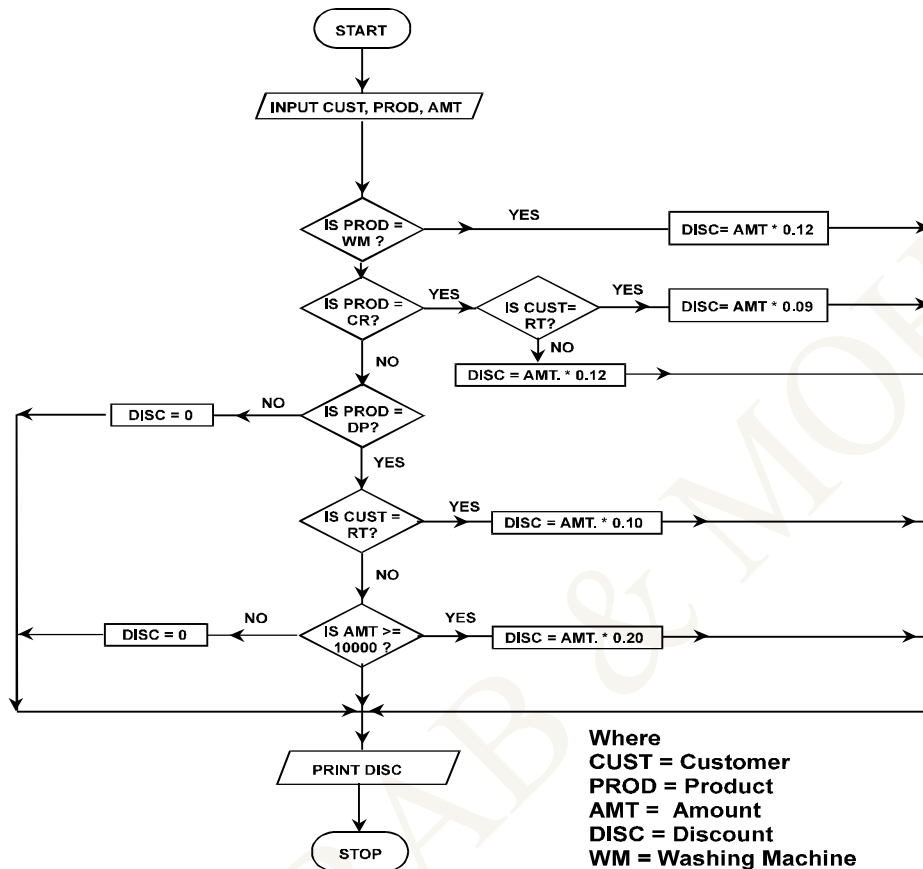
SCHG – Surcharge

INC - Income

EC- Education Cess

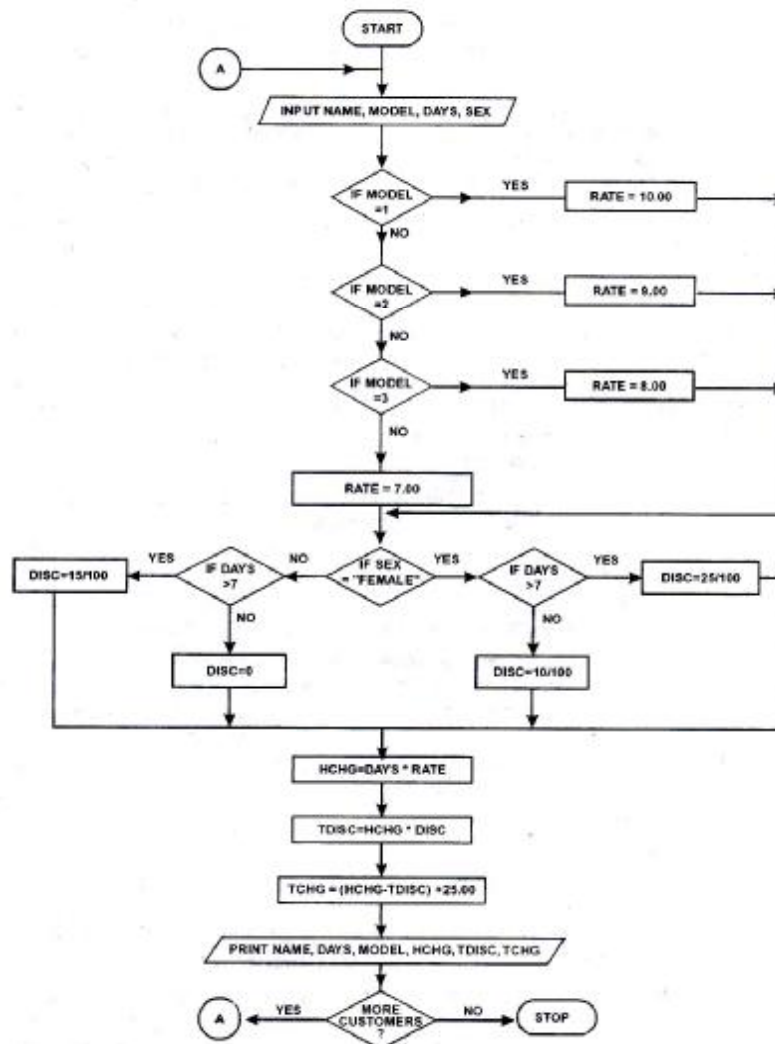
Answer of question 5

The flowchart is given below:



Answer of question 6

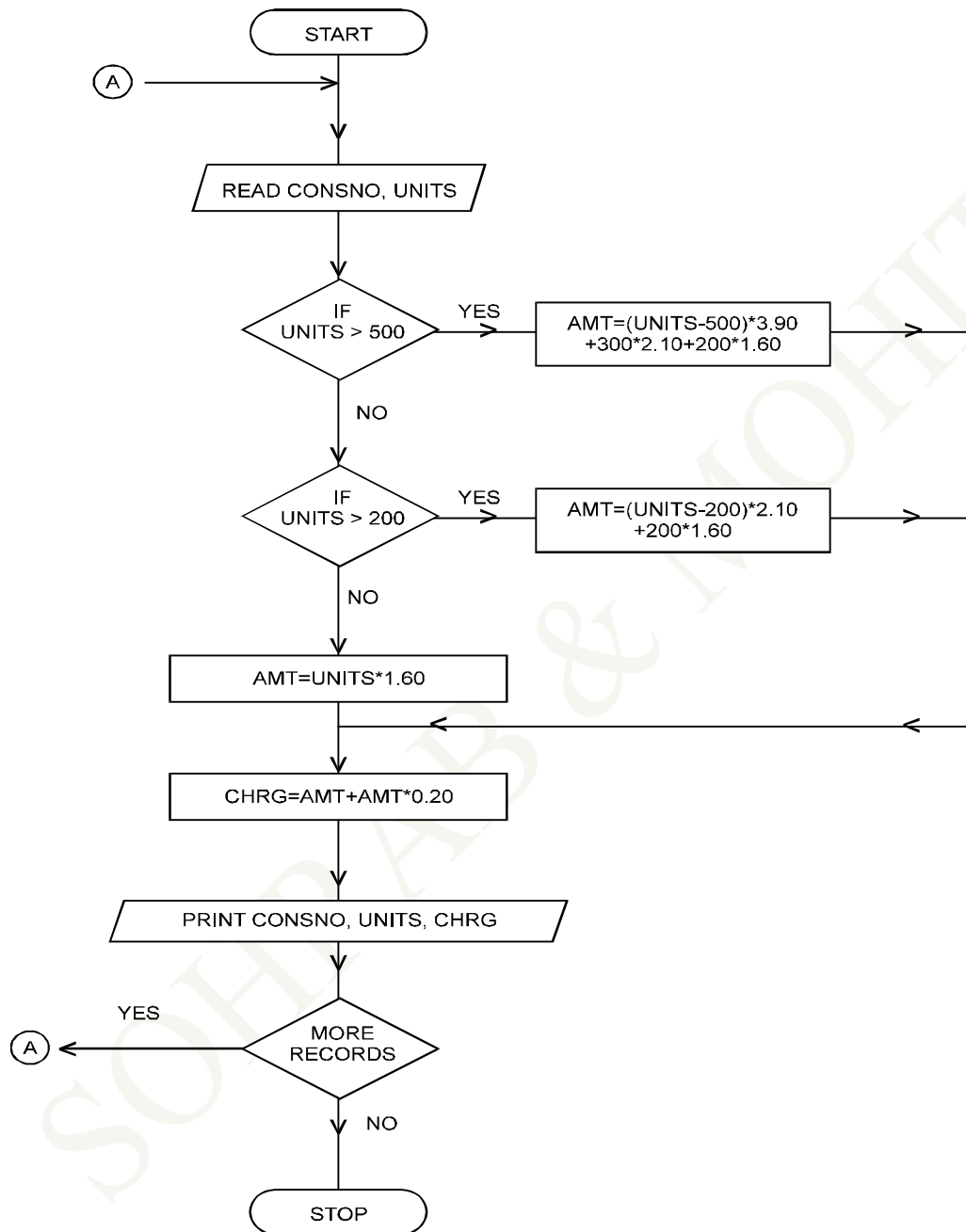
The flowchart is given below:



DISC – Discount
HCHG – Hire Charges
TDISC – Total Discount
TCHG – Total Charges

Answer of question 7

The flowchart is given below:



CONSNO – Consumer Number

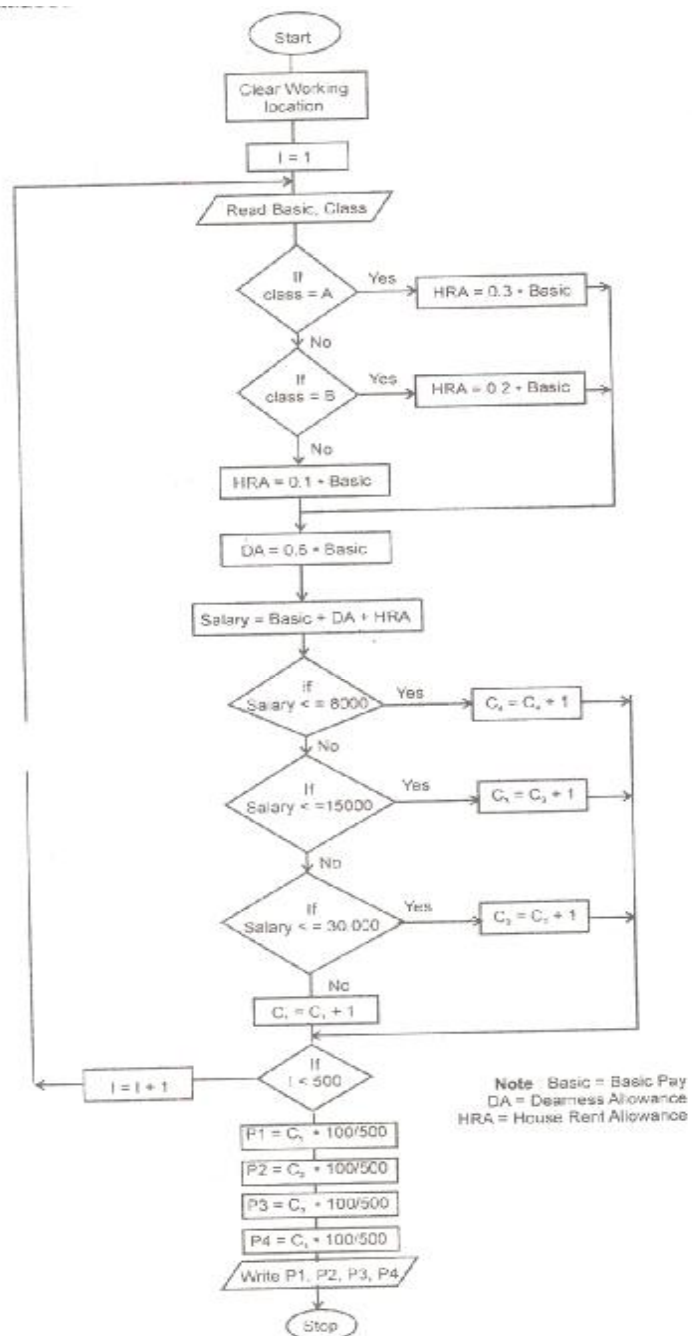
Amt – Amount

Units – Units consumed

CHRG – Charges

Answer of question 8

The flowchart is given below:



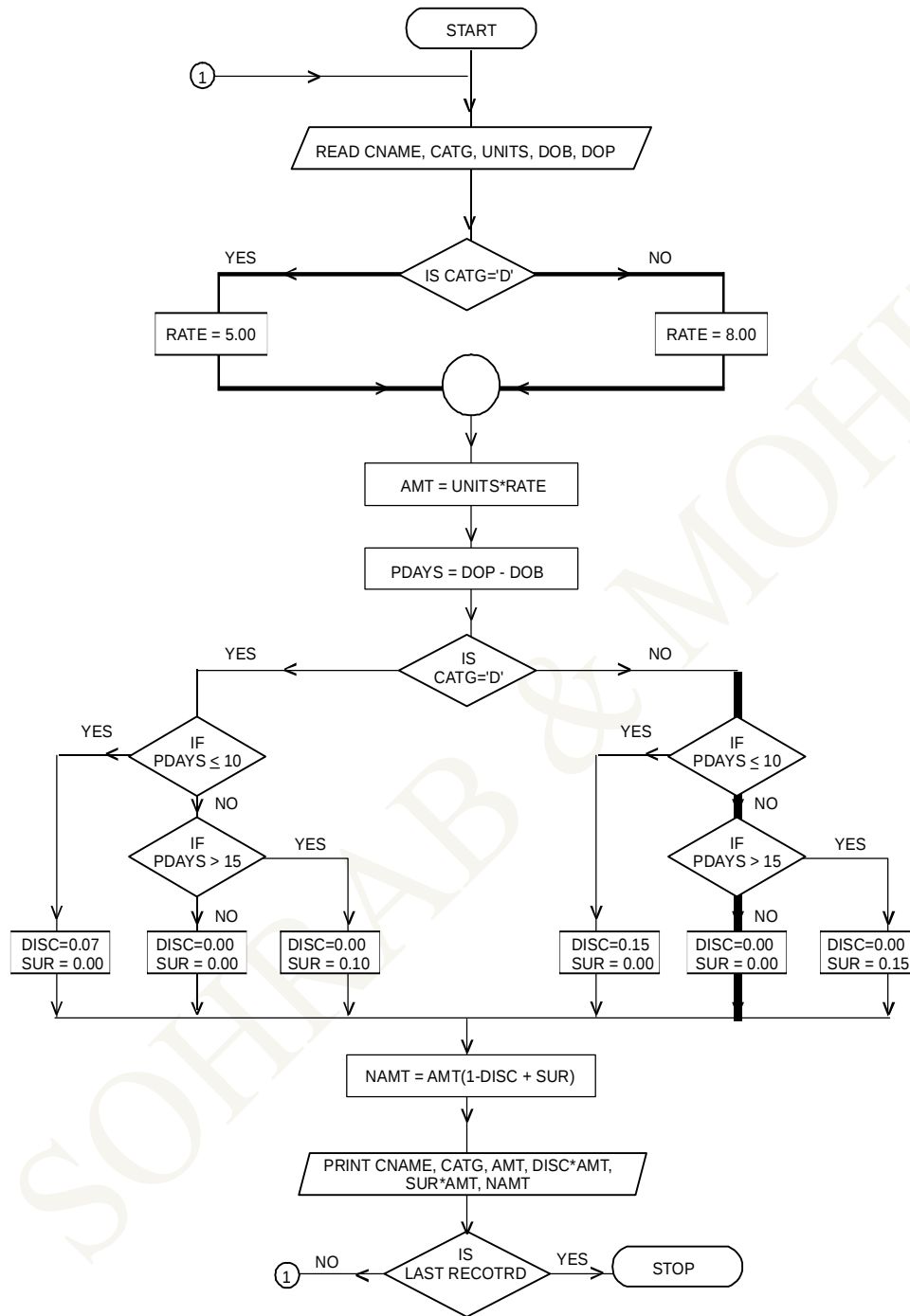
HRA – House Rent Allowance

DA – Dearness Allowance

Basic – Basic Pay

Answer of question 9

The flowchart is given below:



CNAME – Consumer Name

NAMT – Net Amount

CATG – Category

DOB – Date of bill

DOP – Date of payment

PDAYS – Difference between DOP & DOB

DISC – Discount

SUR – Surcharge

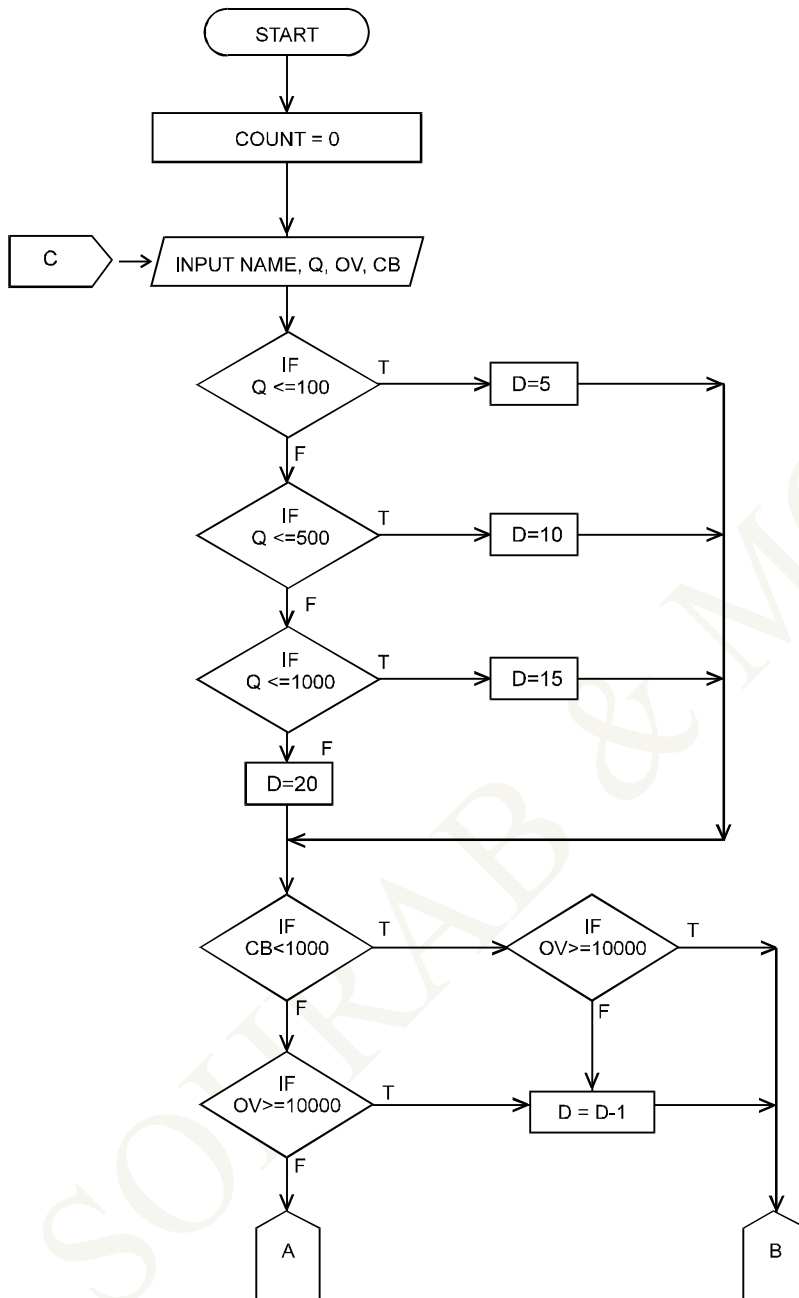
D - Domestic

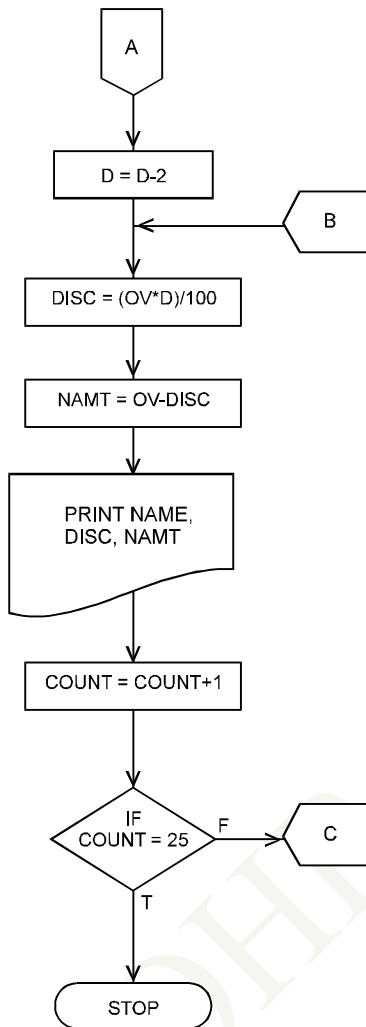
C - Commercial

Amt - Amount

Answer of question 10

The required flowchart is given below:





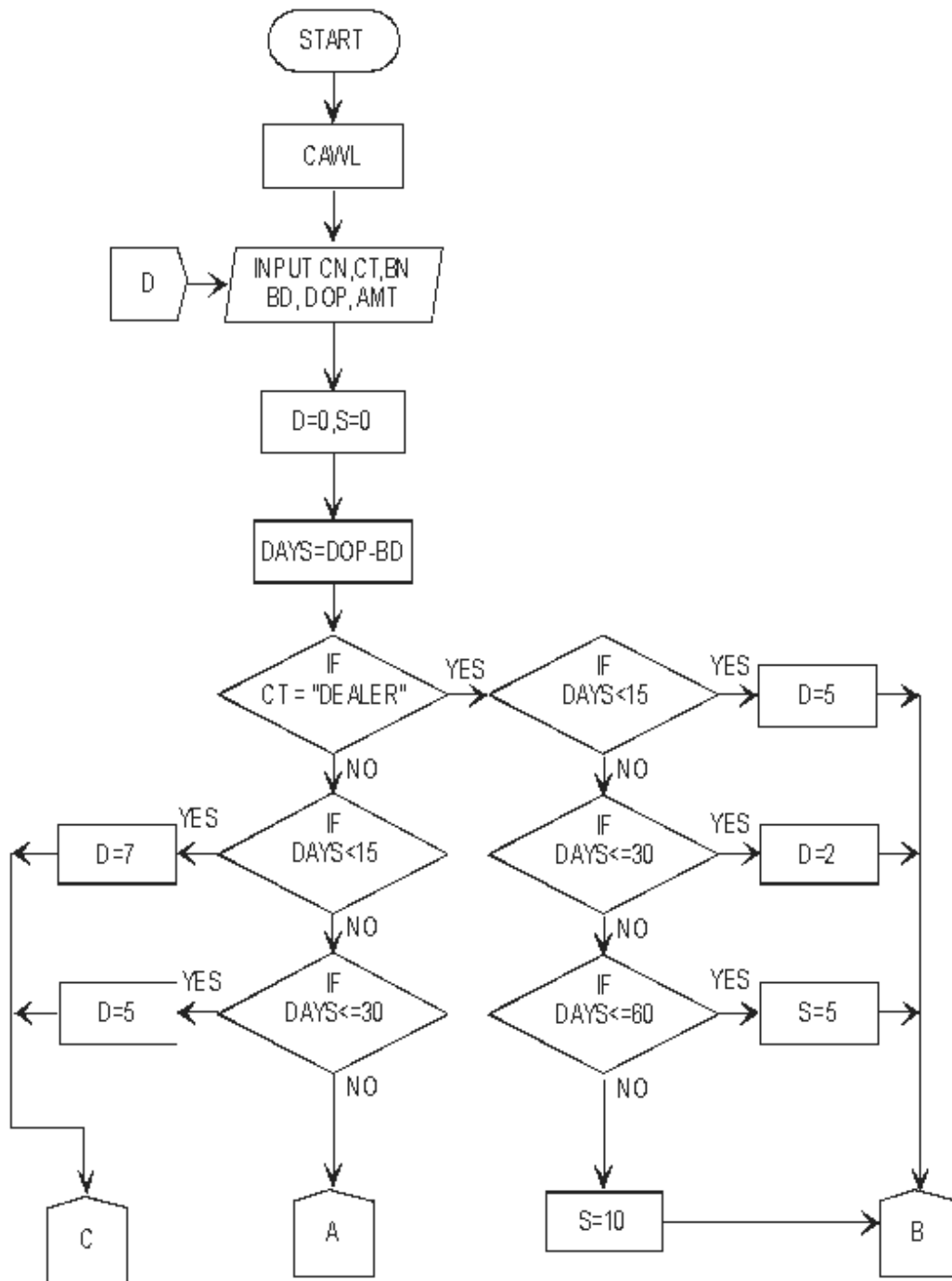
Abbreviations:

Q	=	Quantity
OV	=	Order Value
CB	=	Customer's Accounts Balance
NAMT	=	Net Amount
D	=	Discount
Disc	=	Discount offered
True	=	T
False	=	F

Answer of question 11

Flowchart is given below:

SOHRAB & MOHIT



CAWL - Clear all working locations

CN - Customer Name

CT - Customer Type

BN - Bill Number

BD - Bill Date

Amt - Amount

DOP - Date of payment

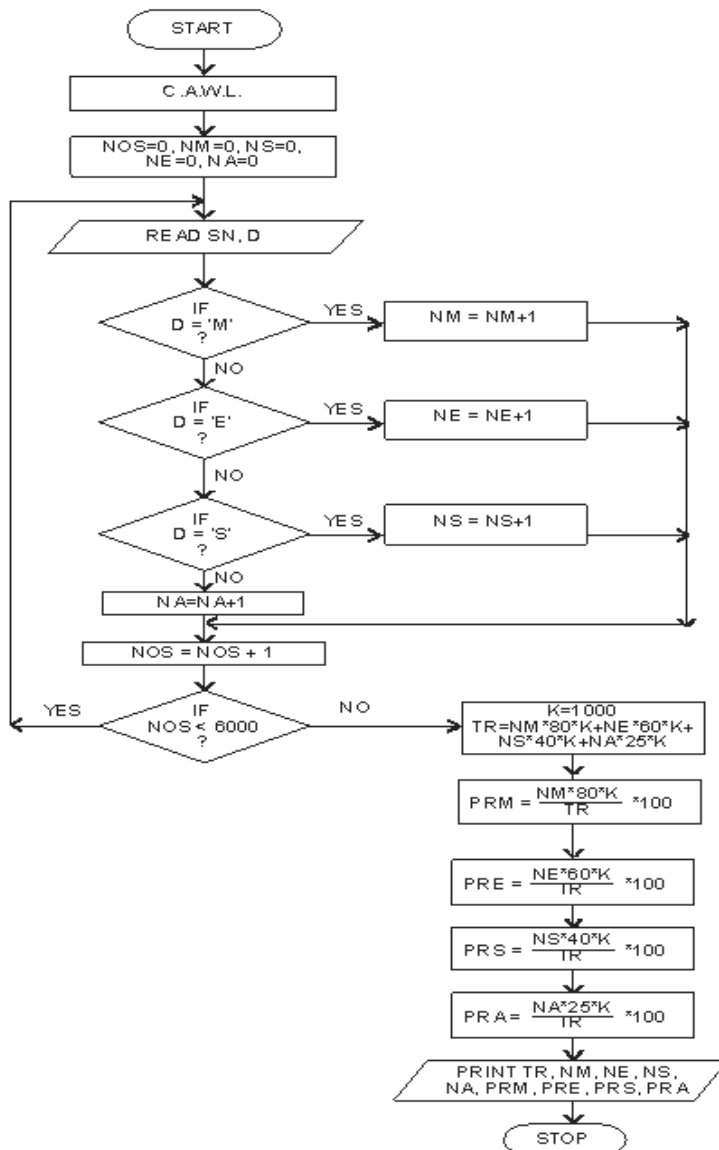
D - Discount

S - Surcharge

Answer of question 12

The flowchart is given below:

SOHRAB & MOHIT



CAWL - Clear all working locations

NOS - Number of students

NM - Medical

NS - Science

NE - Engineering

NA - Arts

D - Discipline of student

TR - Total revenue

PRM - %age of contribution from medical

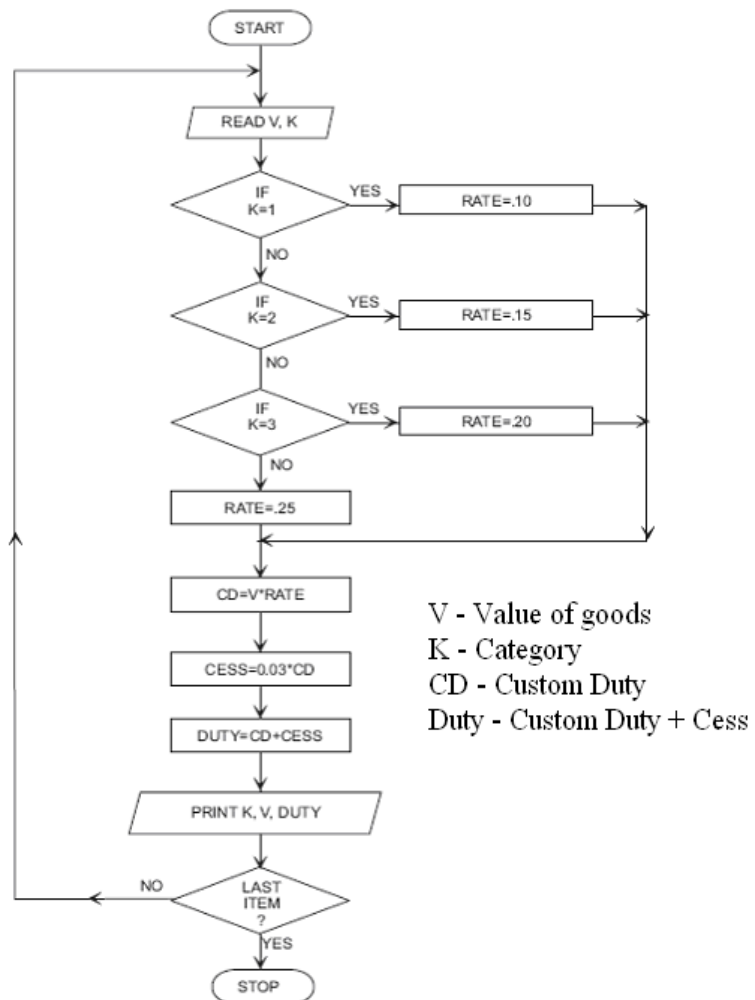
PRS - %age of contribution from science

PRE - %age of contribution from engineering

PRA - %age of contribution from arts

Answer of question 13

The flowchart is given below:



BINARY NUMBERS

TABLE		
1	2	3
Decimal	Binary	Hexa
0	0	0
1	1	1
2	10	2
3	11	3
4	100	4
5	101	5
6	110	6
7	111	7
8	1000	8
9	1001	9
10	1010	A
11	1011	B
12	1100	C
13	1101	D
14	1110	E
15	1111	F
EXTRA		
0-9	Decimal	10
0-1	Binary	2
0-7	Octal	8
0-F	Hexa	16

How to convert from Decimal (whole number) into Binary?

- i) Divide the number by the base number. Put the remainder in a separate column.
- ii) Go on doing the above until quotient becomes less than the divisor (here the base no.)
- iii) When the above stage is reached, put quotient as 0 (zero) and the previous quotient as remainder.
- iv) Start from the last remainder and go upwards to get the equivalent number.

Eg: $(987)_{10} = (\quad)_2$

BINARY		
REMAINDER		
2	987	
2	493	1
2	246	1
2	123	0
2	61	1
2	30	1
2	15	0
2	7	1
2	3	1
2	1	1
	0	1
BINARY EQUIVALENT		
1111011011		

Eg: $(45)_{10} = (\quad)_2$

2	45		
2	22	1	
2	11	0	
2	5	1	
2	2	1	
2	1	0	
	0	1	

$(45)_{10} = (101101)_2$

Eg: $(127)_{10} = (\quad)_2$

2	127		
2	63	1	
2	31	1	
2	15	1	
2	7	1	
2	3	1	
2	1	1	
	0	1	

$(127)_{10} = (1111111)_2$

How to convert from Binary into Decimal (whole number)?

- i) Multiply each digit by the increasing power of the base number (2) starting from the right most digit and ending with power 0 (zero).

$$\text{Eg: } (1111011011)_2 = (\quad)_{10}$$

$$\begin{aligned} &\text{Total 10 digits; so the start from the left and power is 9} \\ &= (1 \times 2^9) + (1 \times 2^8) + (1 \times 2^7) + (1 \times 2^6) + (0 \times 2^5) + (1 \times 2^4) + (1 \times 2^3) + \\ &\quad (0 \times 2^2) + (1 \times 2^1) + (1 \times 2^0) \\ &= 987 \end{aligned}$$

$$\text{Eg : } (101101)_2 = (\quad)_{10}$$

$$\begin{aligned} &\text{Total 6 digits; so the start from the left and power is 5} \\ &= (1 \times 2^5) + (0 \times 2^4) + (1 \times 2^3) + (1 \times 2^2) + (0 \times 2^1) + (1 \times 2^0) \\ &= 45 \end{aligned}$$

$$\text{Eg : } (1111111)_2 = (\quad)_{10}$$

$$\begin{aligned} &\text{Total 7 digits; so the start from the left and power is 6} \\ &= (1 \times 2^6) + (1 \times 2^5) + (1 \times 2^4) + (1 \times 2^3) + (1 \times 2^2) + (1 \times 2^1) + (1 \times 2^0) \end{aligned}$$

How to convert from Decimal (fractional part) into Binary?

- i) Multiply the decimal part by the base number.
- ii) Separate the whole number part each time after multiplying.
- iii) Go on multiplying the decimal part by the base number and accumulate the whole number part until you get 0 (zero) in the decimal part.
- iv) Finally list out all the whole number digits from “ TOP TO BOTTOM”
- v) Eg: 0.15625

	BINARY	EQUIVALENT
		.15625
	x 2	
	0	.3125
	x 2	
	0	.625
	x 2	
	1	.25
	x 2	
	0	.50
	x 2	
	1	.0
	.00101	

How to convert from Binary into Decimal (fractional part)?

- i) Starting from number after decimal go on multiplying each number by the decreasing powers of the base numbers.

BINARY EQUIVALENT
$.00101$ $(0 \times 2^{-1}) + (0 \times 2^{-2}) + (1 \times 2^{-3}) +$ $(0 \times 2^{-4}) + (1 \times 2^{-5})$
$.15625$

How to convert from Decimal into Octal?

- i) Divide the number by base number (8). Put remainder in separate column.
- ii) Go on doing the above until quotient becomes less than the divisor.
- iii) When above stage is reach, put quotient as 0 (zero) & the previous quotient as the remainder.
- iv) Go from “BOTTOM TO TOP” to get the equivalent number.

Eg: $(45)_{10} = ()_8$

8	45		↑
8	5	5	
	0	5	

$(45)_{10} = (55)_8$

Eg: $(127)_{10} = ()_8$

8	127		↑
8	15	7	
8	1	7	
	0	1	

$(127)_{10} = (177)_8$

How to convert from Octal into Decimal?

- i) Multiply each digit by the increasing power of the base number (8) starting from the right most digit and ending with power 0 (zero).

$$(55)_8 = (\quad)_{10}$$

Total 2 digits; so the start from the left and power is 1

$$= (5 \times 8^1) + (5 \times 8^0)$$

$$(55)_8 = (45)_{10}$$

$$(177)_8 = (\quad)_{10}$$

Total 3 digits; so the start from the left and power is 2

$$= (1 \times 8^2) + (7 \times 8^1) + (7 \times 8^0)$$

$$(177)_8 = (127)_{10}$$

How to convert from Decimal into Hexa?

- i) Divide the number by base number (16). Put remainder in separate column.
- ii) Go on doing the above until quotient becomes less than the divisor.
- iii) When above stage is reach, put quotient as 0 (zero) & the previous quotient as the remainder.
- iv) Go from “BOTTOM TO TOP” to get the equivalent number.

Eg: $(45)_{10} = (\quad)_{16}$

16	45		
16	2	13(D)	↑
	0	2	

$(45)_{10} = (2D)_{16}$

Eg: $(127)_{10} = (\quad)_{16}$

16	127		
16	7	15(F)	↑
	0	7	

$(127)_{10} = (7F)_{16}$

How to convert from Hexa into Decimal?

- i) Multiply each digit by the increasing power of the base number (16) starting from the right most digit and ending with power 0 (zero).

$$(2D)_{16} = (\quad)_{10}$$

Total 2 digits; so the start from the left and power is 1

$$= (2 \times 16^1) + (13 \times 16^0)$$

$$= 32 + 13$$

$$= 45$$

$$(2D)_{16} = (45)_{10}$$

$$(7F)_{16} = (\quad)_{10}$$

Total 2 digits; so the start from the left and power is 1

$$= (7 \times 16^1) + (15 \times 16^0)$$

$$= 112 + 15$$

$$= 127$$

$$(7F)_{16} = (127)_{10}$$

How to convert from Octal to Binary?

- i) Take the first digit & see column 1 & 2 from the table.
- ii) Insert the value from column 2 by matching the relevant digit from column 1.
- iii) Eg: $5 = 101$
- iv) Repeat the same procedure for next digit(s).

$$(55)_8 = (\quad)_2$$

$$\begin{array}{cc} = 5 & 5 \\ \downarrow & \downarrow \\ 101 & 101 \end{array}$$

$$(55)_8 = (101101)_2$$

$$(125)_8 = (\quad)_2$$

$$\begin{array}{ccc} = 1 & 2 & 5 \\ \downarrow & \downarrow & \downarrow \\ 001 & 010 & 101 \end{array}$$

$$(125)_8 = (001010101)_2$$

$$(321)_8 = (\quad)_2$$

$$\begin{array}{ccc} = 3 & 2 & 1 \\ \downarrow & \downarrow & \downarrow \\ 011 & 010 & 001 \end{array}$$

$$(321)_8 = (011010001)_2$$

How to convert from Hexa to Binary?

- i) Take the first digit & see column 2 & 3 from the table.
- ii) Insert the value from column 3 by matching the relevant digit from column 2.
- iii) Eg: 1101 = D
- iv) Repeat the same procedure for next digit(s).

$$(2D)_{16} = (\quad)_2$$

= 2	D
▼	▼
0010	1101

$$(2D)_{16} = (00101101)_2$$

$$(13D2F)_{16} = (\quad)_2$$

= 1	3	D	2	F
▼	▼	▼	▼	▼
0001	0011	1101	0010	1111

$$(13D2F)_{16} = (00010011110100101111)_2$$

$$(7F)_{16} = (\quad)_2$$

= 7	F
▼	▼
0111	1111

$$(7F)_{16} = (01111111)_2$$

How to convert from Binary to Hexa?

- i) First follow the procedure of conversion from Octal to Binary i.e. in group of 3 digits.
- ii) And then follow the process of conversion from Binary to Hexa i.e. grouping in 4 digits from right to left.

$$(177)_8 = (\quad)_{16}$$

$$\begin{array}{ccc} = 1 & 7 & 7 \\ \downarrow & \downarrow & \downarrow \\ 001 & 111 & 111 \end{array}$$

B

Now, (00111111)

$$\begin{array}{ccc} 0 & 0111 & 1111 \\ & \downarrow & \downarrow \\ & 7 & F \end{array}$$

$$(177)_8 = (7F)_{16}$$

$$(55)_8 = (\quad)_{16}$$

$$\begin{array}{ccc} = 5 & 5 \\ \downarrow & \downarrow \\ 101 & 101 \end{array}$$

B

Now, (101101)

$$\begin{array}{ccc} 0010 & 1101 \\ \downarrow & \downarrow \\ 2 & D \end{array}$$

$$(55)_8 = (2D)_{16}$$

How to convert from Hexa to Binary?

- i) First follow the procedure of conversion from Hexa to Binary i.e. in group of 4 digits.
- ii) And then follow the process of conversion from Binary to Octal i.e. grouping in 3 digits from right to left.

Eg:

$$(7F)_{16} = (\quad)_8$$
$$\begin{array}{cc} = 7 & F \\ \downarrow & \downarrow \\ 111 & 1111 \end{array}$$

8

Now, (1111111)

$$\begin{array}{ccc} 1 & 111 & 111 \\ \downarrow & \downarrow & \downarrow \\ 1 & 7 & 7 \end{array}$$
$$(7F)_{16} = (177)_8$$
$$(2D)_{16} = (\quad)_8$$
$$\begin{array}{cc} = 2 & D \\ \downarrow & \downarrow \\ 10 & 1101 \end{array}$$

8

Now, (101101)

$$\begin{array}{cc} 101 & 101 \\ \downarrow & \downarrow \\ 5 & 5 \end{array}$$
$$(2D)_{16} = (55)_8$$

How to convert from Binary to Octal?

- i) Group 3 digits from units place.
- ii) See the group & insert the value from column 1 by matching the relevant group from column 2.
- iii) Eg: 101 – 5
- iv) Repeat the procedure from remaining groups from right to left.

$$\begin{aligned}(101101)_2 &= (\quad)_8 \\ &\quad \mathbf{B} \\ &= 101101 \\ &\quad \begin{array}{cc} 101 & 101 \\ | & | \\ \blacktriangledown & \blacktriangledown \\ 5 & 5 \end{array} \\ (101101)_2 &= (55)_8\end{aligned}$$

$$\begin{aligned}(1010101)_2 &= (\quad)_8 \\ &\quad \mathbf{B} \\ &= 1010101 \\ &\quad \begin{array}{ccc} 001 & 010 & 101 \\ | & | & | \\ \blacktriangledown & \blacktriangledown & \blacktriangledown \\ 1 & 2 & 5 \end{array} \\ (1010101)_2 &= (125)_8\end{aligned}$$

$$(1100110100)_2 = (\quad)_8$$

$$= 1100110100$$

001	100	110	100
▼	▼	▼	▼
1	4	6	4

$$(1100110100)_2 = (1464)_8$$

Note: If the last group (left side group) does not have 3 digits then prefix 0 (zero) to make the group of 3 digits.

Eg:

$$1 = \text{prefix } 0 \blacktriangleright 001 \blacktriangleright 1$$

$$11 = \text{prefix } 0 \blacktriangleright 011 \blacktriangleright 3$$

How to convert from Binary to Hexa?

- i) Group 4 digits from units place.
- ii) See the group & insert the value from column 3 by matching the relevant group from column 2.
- iii) Eg: 1101 – D
- iv) Repeat the procedure from remaining groups from right to left.

$$(101101)_2 = (\quad)_{16}$$

$$\begin{array}{c} \mathbf{B} \\ = 101101 \end{array}$$

0010 1101

|

▼

2

|

▼

D

$$(101101)_2 = (2D)_{16}$$

$$(1111111)_2 = (\quad)_{16}$$

$$\begin{array}{c} \mathbf{B} \\ = 1111111 \end{array}$$

0111 1111

|

▼

7

|

▼

F

$$(1111111)_2 = (7F)_{16}$$

$$(10010001001001)_2 = (\quad)_{16}$$

B

$$= 10010001001001$$

0010 0100 0100 1001

↓ ↓ ↓ ↓
2 4 4 9

$$(10010001001001)_2 = (2449)_{16}$$

Note: If the last group (left side group) does not have 4 digits then prefix 0 (zero) to make the group of 4 digits.

Eg:

$$1 = \text{prefix } 0 \blacktriangleright 0001 \blacktriangleright 1$$

$$11 = \text{prefix } 0 \blacktriangleright 0011 \blacktriangleright 3$$

Ex. 1 The details of procedure for dealing with delivery charges for goods bought from ABC Company is given below :

For calculating the delivery charges, customers are divided into two categories, those whose sales region code is 10 or above and those with the code of less than 10.

If the code is less than 10 and the invoice amount is less than Rs. 10,000, the delivery charge to be added to the invoices total is Rs. 200. But if the invoice value is for Rs. 10,000 or more, the delivery charge is Rs. 100.

If the code is equal to or greater than 10, the corresponding delivery charges are Rs. 250 and Rs. 150 respectively.

Prepare a limited entry decision table of the above procedure.

Ex. 2 While invoicing each customer, the invoice clerk has to work out the discounts allowable on each order. Any order over Rs. 20,000 attracts a "bulk" discount of 8%.

A customer within the trade is allowed additional 10% . There is also a special discount of 5% allowed for any customer who has been ordering regularly for over 5 years.

Prepare a limited entry decision table; to illustrate the clerical procedure for working out this management policy. (All of the above conditions are independent of each other).

Ex. 3 A shop owner allows credit facility to his customers if they satisfy any one of the following conditions :

1. Holding the present job for more than 3 years and residing in the same place for more than 5 years.
2. Monthly Salary exceeds Rs. 1500 and holding the present job for more than 3 years.
3. Residing in the same place for more than 5 years and monthly salary exceeds Rs. 1500.

Prepare a limited entry decision table

Ex. 4 A hire-purchase scheme has adopted the following criterion for its customers. The customers will get the credit facility if they satisfy any of the following conditions:

- i. The customer must hold the present job for more than 5 years and reside in the same place for at least 3 years. In this case, the customer will get credit upto rupees three thousand.
- ii The monthly salary of the customer must exceed rupees two thousand and must hold the present job for more than 5 years. In this case credit will be given upto rupees four thousand.

- iii. The monthly salary must exceed rupees two thousand and reside at the same place for atleast 3 years. In this case credit will be given upto rupees four thousand.
- iv In the case, the customer's monthly salary exceeds rupees two thousand, holds the present job for more than 5 years and also resides in the same place for atleast 3 years, the credit facility will be upto rupees five thousand.

Prepare a limited entry decision table

Ex. 5 Input customer name, type, bill number, bill date, amount and the date of payment. If the customer is a dealer and pays his bills within 30 days, 10% discount is allowed. If it is 30 to 45 days, discount and surcharge is zero. If he pays after 45 days, he has to pay 10% surcharge. The corresponding percentages for a manufacturer are 12 1/2%, 0, 12 1/2%.

- a. Write a flowchart to calculate and print the discount, surcharge and net amount of each customer.
- b. Write a decision table for the above problem.

Ex. 6 Prepare decision table for the following.

A cheque is presented at a bank. The cashier has to decide what to do. The rules state that "on presentation of a cheque the cashier is required to ensure that there are sufficient funds in the account to meet the amount specified and to check that there exist no reasons why the cheque should not be honoured. Those cheques accepted and which are of outstation are charged a handling fee, otherwise a charge at standard rates will be made".

Ex. 7 Draw a decision table to find out maximum of the three nos. A, B, C.

Ex. 8 A sales organisation is seeking to hire some salesman and some saleswomen having special characteristics. They only need unmarried personnel between age of 18 - 30. If male, they want salesman to be over 5.5 feet in height but less than 75 kgs. in weight and not bald. If female, the saleswoman should be less than 5.5 feet in height and less than 55 kgs. in weight and is to have shoulder length hair. Prepare a limited entry decision table.

Ex.9 Prepare a decision table for the following conditions & actions.

- C1 - Request for first class .
- C2 - Requested space available
- C3 - Alternate class acceptable
- C4 - Requested space available

A 1 - Make first class reservation

A 2 - Make tourist reservation

A 3 - Name on first class waiting list

A 4 - Name on tourist class waiting list

*Sanjay Singh
JK*

Ex.10 Prepare a limited entry table for the following:

New and No basic Reference

No credit

Has basic reference and has been a customer before

30 days credit

Customer of special status

45 days credit

Ex.11 Draw an extended entry table for the following :

No. Cards	Discount	Order Value	Postage
0 - 20	Nil	Rs.100 and below	Rs.10
21 - 50	5%	Between Rs.100 & 500	Rs.20
51 - 100	7.5%	Above 500	Rs.30
100 above	10%		



16/12/2007

Sunday.

* For calculating the Delivery charges customers are

* RULES

→ Two Rules can be combined if all the conditions except one (1) have saying Y or N (or -) condition entries and actions are same

→ Impossible combinations can be combined with any other rule if all the conditions except 1 have saying Y or N (or -) condition entries

Q. No. 1

* For calculating the delivery charges customers are divided into two categories, those whose sales region code is 10 or above and those with the code of less than 10. If the code is less than 10 and Invoice amount is less than 10000, the delivery charges is 200.

But if invoice amount is 10000 or more, delivery charges is 100.

If the code is equal to or >10 , the corresponding delivery charges are Rs. 250 and Rs. 150 respectively.

Solution

Conditions:-

- 1) Sales region code 10 or above = C₁
- 2) Invoice amount is less than 10000 = C₂

Actions:-

1) Delivery charges	Rs. 200	= A ₁
————— " —————	Rs. 100	= A ₂
————— " —————	Rs. 250	= A ₃
————— " —————	Rs. 150	= A ₄

$$\begin{aligned}\text{No. of rules} &= \text{no. of conditions} \\ &= 2^2 \\ &= \underline{\underline{4}}\end{aligned}$$

Decision Table to Find Delivery Charges.

	R1	R2	R3	R4
C ₁	Y	Y	N	N
C ₂	Y	N	Y	N
A ₁			X	
A ₂				X
A ₃	X			
A ₄		X		

Q. No. 2.

While Invoicing customer, the clerk has to work out the discount allowable on each order.

Any order over Rs. 20000/- attracts a bulk discount of 8%.

A customer within the trade is allowed 10%.

There is also a special discount of 5% allowed for any customer who has been ordering regularly for over 5 years.

[All conditions are independent].

Solution:-

Conditions:

- 1) Order over Rs. 20,000/- = C1
- 2) Customer within the trade = C2
- 3) Ordering regularly for over 5 years. = C3.

Actions:-

- 1) Bulk Discount of 8% = A1
- 2) Additional Discount of 10% = A2
- 3) special discount of 5% = A3
- 4) No Discount = A4.

No. of Rules = $2^{\text{no. of conditions}}$

$$= 2^3$$

$$= 8$$

	R_1	R_2	R_3	R_4	R_5	R_6	R_7	R_8
C1	Y	Y	Y	Y	N	N	N	N
C2	Y	Y	N	N	Y	Y	N	N
C3	Y	N	Y	N	Y	N	Y	N
A1	X	X	X	X				
A2	X	X			X	X		
A3	X		X		X		X	
A4								X

Q. No. 3.

A shop owner allows credit facility to his customer if they satisfies any one of the following conditions:-

- (1) Holding the present job for more than 3 years and residing in the same place for more than 5 years.
- (2) Monthly salary exceeds Rs. 1500/- and holding the present job for more than 3 years.
- (3) Residing in the same place for more than 5 years and monthly salary exceeds Rs. 1500.

Solution:-

Conditions:-

- 1) Holding the present job for more than 3 yrs = C1
- 2) Residing in same place for more than 5 yrs = C2
- 3) Monthly salary exceeds Rs. 1500 = C3.

Actions:-

- 1) Allow credit facility = A1
- 2) Do not allow credit facility = A2

$$\begin{aligned} \text{No. of Rules} &= 2^{\text{no. of conditions}} \\ &= 2^3 \\ &= 8 \end{aligned}$$

	R1	R2	R3	R4	R5	R6	R7	R8
C1	Y	Y	Y	Y	N	N	N	N
C2	Y	Y	N	N	Y	Y	N	N
C3	Y	N	Y	N	Y	N	Y	N
A1	X	X	X	X	X	X	X	X
A2				X		X	X	X

Combining R₁ and R₂ and R₄ and R₈

	R ₁	R ₂	R ₃	R ₄	R ₅	R ₆
C1	Y	Y	Y	N	N	N
C2	Y	N	N	Y	Y	N
C3	—	Y	N	Y	N	—
A1	X	X		X		
A2			X		X	X

A Hire - purchase

To get credit facility, customer has to satisfy any of the following:-

i) The customer must hold the present job for more than 5 years and reside in the same place for atleast 3 years. In this case the customer will get credit facility upto Rs. 3000/-

ii) The monthly salary of customer must exceed Rs. 2000/- must hold present job for more than 5 years. In this case the customer will get credit facility upto Rs. 4000/-

iii) The monthly salary must exceed Rs. 2000 and reside at the same place for atleast 3 years. In this case the credit facility will be given upto Rs. 4000/-

iv) In the case the customer's monthly salary exceeds Rs. 2000/- holds the present job for more than 5 years and also resides at the same place for atleast 3 yrs; the credit facility will be given upto Rs. 5000/-

	R_1	R_2	R_3	R_4	R_5	R_6	R_7
C1	y	y	y	y	N	N	N
C2	y	y	N	N	y	y	N
C3	y	N	y	N	y	N	-
A1	x	x					
A2	x		x		x		
A3	x						
A4				x		x	x

Q. No. 5

If the customer is a dealer and pays his bill within 20 days, 10% discount is allowed.

If it is 30 to 45 days, discount and surcharge is zero. If he pays after 45 days, he has to pay 10% surcharge.

The corresponding percentages for a manufacturer are 12.5%, 0, 12.5%.

Solⁿ:

Customers	Days	Discount	Surcharge
① Dealer	0-30	10%	0
	30-45	0	0
	>45	0	10%
② Manufacturer	0-30	12.5%	0
	30-45	0	0
	>45	0	12.5%

Conditions:-

- Let
- 1) Dealer = C1
 - 2) Pays bill within 30 days. = C2
 - 3) Pays bill within 30 to 45 days. = C3

Actions:-

- 1) Discount 10% and Surcharge 0 A1
- 2) Discount 0% and Surcharge 0 A2
- 3) Discount 0% and Surcharge 10% A3
- 4) Discount 12.5% and Surcharge 0 A4
- 5) Discount 0 and Surcharge 12.5% A5

4)

$$\text{No. of Rules} = 2^{\text{no. of conditions}} \\ = 2^3 = 8.$$

	R1	R2	R3	R4	R5	R6	R7	R8
C1	Y	Y	Y	Y	N	N	N	N
C2	Y	Y	N	N	Y	Y	N	N
C3	Y	N	Y	N	Y	N	Y	N
A1		X						
A2			X				X	
A3				X				
A4						X		
A5								X
	NA				NA			

Combining R3 and R7, R2 and R4, R5 and R6

Q. No. 6.

Conditions: 1) Sufficient fund.

= C₁

2) No reason why the cheque should not be honoured.

= C₃

3) Out station.

Action:- 1) Accept with ~~at~~ hand.

= A₁

2) Accept with ~~std~~ (Standard charges).

= A₂

3) Do not accept.

= A₃

No. of rules = $2^3 = 8$.

	R ₁	R ₂	R ₃	R ₄	R ₅	R ₆	R ₇	R ₈
C ₁	Y	Y	Y	Y	N	N	N	N
C ₂	Y	Y	N	N	Y	Y	N	N
C ₃	Y	N	Y	N	Y	N	Y	N
A ₁	X							
A ₂		X						
A ₃			X	X	X	X	X	X

Combining R₃ and R₄, R₅ and R₆ and R₇ and R₈

	R ₁	R ₂	R ₃	R ₄	R ₅	R ₆
C ₁	Y	Y	Y	N	N	
C ₂	Y	Y	N	Y	N	
C ₃	Y	N	—	—	—	
A ₁	X					
A ₂		X				
A ₃			X	X	X	

Combining R_4 and R_5

	R_1	R_2	R_3	R_4
C_1	Y	Y	Y	N
C_2	Y	Y	N	-
C_3	Y	N	-	-
A_1	X			
A_2		X		
A_3			X	X

Q. 7. Decision table to find greatest no.

Conditions :- 1) $A > B$ = C_1
 2) $A > C$ = C_2
 3) $B > C$ = C_3

Actions :- 1) A is greatest = A_1
 2) B is greatest = A_2
 3) C is greatest = A_3

Rules = 2^{no. of conditions} = $2^3 = 8$

	R_1	R_2	R_3	R_4	R_5	R_6	R_7	R_8
C_1	Y	Y	Y	Y	N	N	N	N
C_2	Y	Y	N	N	Y	Y	N	N
C_3	Y	N	Y	N	Y	N	Y	N
A_1	X	X						
A_2					X		X	
A_3				X				X

Not possible
Not possible

Combining $R_1, R_2, R_3, R_4, R_5, R_7$ and R_6, R_8

	R_1	R_2	R_3	R_4
C_1	Y	Y	N	N
C_2	Y	N	-	-
C_3	-	-	Y	N
A_1	X			
A_2			X	
A_3		X		X

Q.8] Conditions :- i) Unmarried $= C_1$
 ii) Age 18-30 $= C_2$
 iii) Male $= C_3$

Actions :- i) Go to Male table
 ii) Go to female table
 iii) Reject

Rules = 2^{no. of observation} $= 2^3 = 8$

	R_1	R_2	R_3	R_4	R_5	R_6	R_7	R_8
C_1	Y	Y	Y	Y	N	N	N	N
C_2	Y	Y	N	N	Y	Y	N	N
C_3	Y	N	Y	N	Y	N	Y	N
A_1	X							
A_2		X						
A_3			X	X	X	X	X	X

Combining $R_3 R_4$, $R_5 R_6$ and $R_7 R_8$.

	R_1	R_2	R_3	R_4	R_5
C_1	Y	Y	Y	Y	N
C_2	Y	Y	N	Y	N
C_3	Y	N	-	-	-
A_1	X				
A_2		X			
A_3			X	X	X

Combine $R_4 R_5$

	R_1	R_2	R_3	R_4
C_1	Y	Y	Y	N
C_2	Y	Y	N	-
C_3	Y	N	-	-
A_1	X			
A_2		X		
A_3			X	X

* Q.9]

Decision table for : man.

	R ₁	R ₂	R ₃	R ₄	R ₅	R ₆	R ₇	R ₈
C ₁ Over 5.5 feet in height	Y	Y	Y	Y	N	N	N	N
C ₂ less than 75 kg	Y	Y	N	N	Y	Y	N	N
C ₃ not bald.	Y	N	Y	N	Y	N	Y	N
A ₁ Accept	X							
A ₂ Reject		X	X	X	X	X	X	X

Combining R₃ R₄, R₅ R₆ and R₇ R₈.

	R ₁	R ₂	R ₃	R ₄	R ₅
C ₁ Over 5.5 feet in height	Y	Y	Y	N	N
C ₂ less than 75 kg	Y	Y	N	Y	N
C ₃ not bald.	Y	N	-	-	-
A ₁ Accept	X				
A ₂ Reject		X	X	X	X

Combining R₄ and R₅ -

	R ₁	R ₂	R ₃	R ₄
C ₁ Over 5.5 feet in height	Y	Y	X	N
C ₂ less than 75 kg	Y	Y	N	-
C ₃ not bald	Y	N	-	-
A ₁ Accept	X			
A ₂ Reject		X	X	X

Q. 10]

*

Decision table for female

		R ₁	R ₂	R ₃	R ₄	R ₅	R ₆	R ₇	R ₈
C ₁	less than 5.5 ft in height	Y	Y	Y	Y	N	N	N	N
C ₂	less than 55 kg	Y	Y	N	N	Y	Y	N	N
C ₃	shoulder hair	Y	N	Y	N	Y	N	Y	N
A ₁	Accept	X							
A ₂	Reject		X	X	X	X	X	X	X

Combining - R₃R₄, R₅R₆ and R₇R₈

Same as previous case (Male)

Q. No. 9

$$2^4 = 16$$

Q. No. 11 Decision table for reservation:-

	R ₁	R ₂	R ₃	R ₄	R ₅	R ₆	R ₇	R ₈	R ₉	R ₁₀	R ₁₁	R ₁₂	R ₁₃	R ₁₄	R ₁₅	R ₁₆
C ₁ Request for 1st Class	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	N	N	N	N	N
C ₂ Requested for 1st class available	Y	Y	Y	X	N	N	N	N	Y	Y	Y	Y	N	N	N	N
C ₃ Request for alternative class	Y	Y	N	N	Y	Y	N	N	Y	Y	N	N	Y	N	N	N
C ₄ Requested for alternative class available	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N
A ₁ Make first class reservation	X	X	X	X												
A ₂ Make tourist reservation								X	X							
A ₃ Name of 1st class waiting class				X	X	X	X									
A ₄ Name of tourist class waiting class									X	X			X			

Not possible

Not possible

Q. 12]

$$2^3 = 8$$

		R ₁	R ₂	R ₃	R ₄	R ₅	R ₆	R ₇	R ₈
C ₁	New	Y	Y	Y	Y	N	N	N	N
C ₂	No. basic ref.	Y	Y	N	N	Y	Y	N	N
C ₃	Special status	Y	N	Y	N	Y	N	Y	N
A ₁	No credit		X		X		X		
A ₂	30 days credit								X
A ₃	45 days credit	X		X		X		X	

Combining R₁ and R₃, R₂ and R₄, R₅ and R₇.

	R ₁	R ₂	R ₃	R ₄	R ₅
C ₁	Y	Y	N	N	N
C ₂				Y	N
C ₃	Y	N	Y	N	N
A ₁		X		X	
A ₂					X
A ₃	X		X		

	R_1	R_2	R_3	R_4	R_5	R_6	R_7
C1	Y	Y	Y	Y	N	N	N
C2	Y	Y	N	N	Y	Y	N
C3	Y	N	Y	N	Y	N	Y
A1		X					
A2			X				X
A3				X			
A4						X	
A5							

NA

NA

Combining again R_3 and R_2

	R_1	R_2	R_3	R_4	R_5	R_6
C1	Y	Y	Y	Y	N	N
C2	Y	Y	N	N	Y	Y
C3	Y	N	Y	N	Y	N
A1		X				
A2			X			
A3				X		
A4						X
A5						

NA

NA