

## System Analysis & Design

### Paper Solution : March / April – 2010

**Q.1 (A) Explain the following :**

**05**

**1. Define the term System.**

**Ans.** A system is simply a set of related components which interact with each other to accomplish some purpose or specific objective. System is derived from the Greek word *Systema* which means an organized relationship among functioning units.

e.g.,

- ◆ The Education System consist of many components like Faculty, Students, Administrative Staff, Infrastructure, Management etc..
- ◆ A Business is also a System consisting of many departments (components) like Purchase, Production, Accounts, Marketing, Stores, Personnel etc..

**2. Define the term System Analyst.**

**Ans.** A business professional who uses analysis and design techniques to solve business problems using information technology. The systems analyst is a key person analyzing the business, identifying opportunities for improvement, and designing information systems to implement these ideas.

**3. What is an Interface ?**

**Ans.** An Interface is the common boundary between the user and the computer system application.

**The purpose of Interface is :**

- ◆ Tell the System what actions to take.
- ◆ Facilitate use of the System.
- ◆ Avoid User errors.

#### 4. What do you mean by Behavior ?

Behavioral View depicts the dynamic aspect of Software System Model. Processes are realization methods (behavior). Methods when applied in a real scenario to accomplish a particular task constitute dynamic aspect of the System.

#### 5. What is System Analysis ?

**Ans.** System Analysis is the process of complete understanding the current system by gathering and interpreting facts, diagnosing problems, and using the facts to improve current system.

##### System Analysis is :

- Understanding the goals and strategies of the business.
- Defining the information requirements that support those goals and strategies.
- It is not about programming.

##### **Q.1 (B) Answer the following (Any two) :**

##### 1. Write a short note on Types of Systems.

**Ans.** A system is simply a set of related components that interact with each other to attain a specific objective. Component of a system are as follows :

- |             |            |
|-------------|------------|
| ● Input     | ● Output   |
| ● Control   | ● Boundary |
| ● Interface | ● Feedback |

The common classification of System are as follows :

- (1) Physical or Abstract Systems.
- (2) Open or Closed Systems.
- (3) Deterministic or Probabilistic Systems.
- (4) Man-made Information Systems.

**Physical or Abstract Systems :**

Physical Systems are tangible entities that may be static or dynamic in operation. e.g. Computer is Physical System.

Abstract Systems are conceptual or non-physical entities which may be relationship among sets of variables or models. e.g. Mathematical Model or Model of a space shuttle.

 **Open or Closed System :**

Open System are those systems that are affected by external and internal factors. Systems that interact with their environment are called Open Systems. They receive input from and deliver output to the surroundings. e.g. Any System in real life as Business System is an Open System.

Closed Systems are those systems which are acted upon by only internal factors. Systems that do not interact with the environment are called Closed Systems. There is no effect of external forces on the System. Closed System is isolated system which is not practically possible in real life.

 **Deterministic or Probabilistic Systems :**

A Deterministic System is one in which the occurrence of all events is perfectly predictable. The next state of the System can be accurately predicted. e.g. Numerically controlled machine tool is an example of Deterministic System.

Probabilistic System is one in which the occurrence of events cannot be perfectly predicted. e.g. Warehouse and its contents.

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 **Man-made Information Systems :**

Information System is the basis for interaction between the user and the analyst. It determines the nature of relationship among decision makers. Information System can be defined as a set of devices, procedures and operating systems designed around user-based criteria to produce information and communicate it to the user for planning, control and performance. Information Systems are classified into :

- ◆ Formal Information Systems.
- ◆ Informal Information Systems.
- ◆ Computer based Information Systems.

(1) **Formal Information Systems :** Formal Information System is based on the organization represented by the organization chart. It is concerned with the pattern of authority, communication and work flow.

(2) **Informal Information Systems :** Informal Information System is an employee based system designed to meet personnel and vocational needs to help in the solution of work-related problems. It works within the framework of the business and its stated policies.

(3) **Computer based Information Systems :** System Analysts develop several different types of Information Systems to meet a variety of business needs. This class of Systems is known as CBIS or Computer based Information Systems. This can be further sub classified as :

- ◆ Transaction Processing Systems (TPS).
- ◆ Management Information Systems (MIS).
- ◆ Decision Support Systems (DSS).
- ◆ Office Automation Systems (OAS).

2. Which are the tools used for documenting procedures and decisions ? Explain any one in detail.

Ans. A tool is any device, object or operations used to accomplish a specific task. Tools help analysts assemble information gathered through data collection methods. Three tools are mainly used for documenting the procedures which are as follows :

- (1) Decision Tree
- (2) Decision Table
- (3) Structured English

When analyzing procedures and decision the analysts must start by identifying condition and action concepts common to all activities.

#### Condition And Decision Variable :

Condition is the possible set of event that leads to the selection of different alternatives. Conditions vary so analysts refer to them as a decision variable.

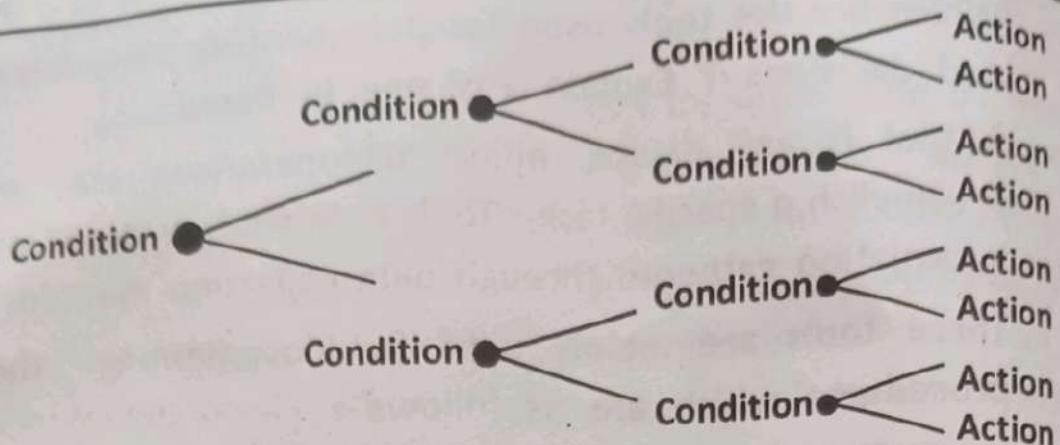
#### Action :

Actions are the alternatives-the step, activities or procedures that an individual may decide to take when confronted with a set of condition.

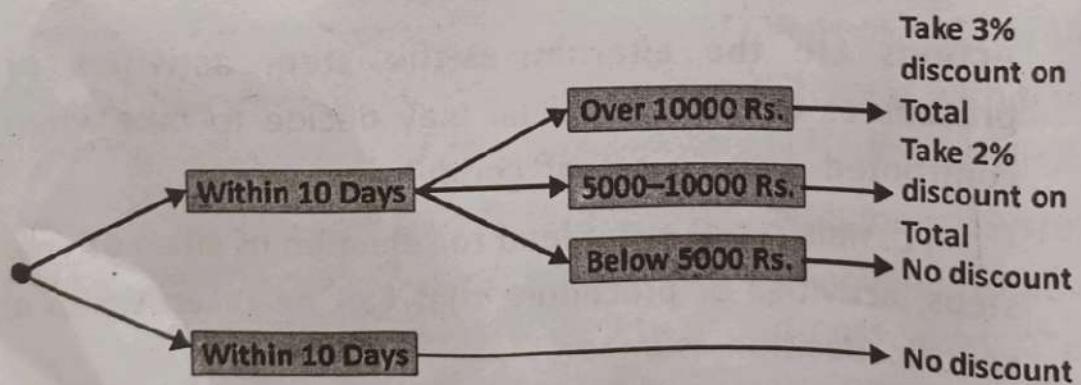
Possible set of event lead to selection of alternatives, steps, activities or procedure that can be taken when a specific decision is made.

#### Decision Tree :

A Decision tree is diagram that presents conditions and actions sequentially and thus shows which conditions to consider first, which second and so on. It is also a method of showing the relationship of each condition and its permissible actions. The diagram resembles branches on a tree.



The root of the tree, on the left of the diagram, is the starting point of the decision sequence. The particular branch to be followed depends on the conditions that exist and the decision to be made. Progression from left to right in any branch will give the sequence of decision. One decision point will lead to another decision point. The nodes of the tree thus represent conditions and indicates that a determination must be made about which condition exists before the next path can be chosen. The right side of the tree lists the actions to be taken, depending upon the sequence of condition that is followed.



There are two aspects to be looked into while preparing a decision tree :

- ◆ The Decision Tree needs to be binary. i.e only two nodes coming out of a node.
- ◆ The Decision Tree needs to be balanced i.e. Both the left and right nodes need to have almost the same number of branches.

**Decision Table :**

A decision table is a matrix of rows and columns, rather than a tree, that shows conditions and actions. Decision rules, included in a decision table, state what procedure to follow when certain conditions exists.

The decision table is made up of four sections: Condition statements, condition entry, action statements, action entries. The condition statement identifies relevant conditions. Condition entries tell which value, if any applies for a particular condition. Action statements list the set of all steps that can be taken when a certain condition occurs. Action entries show what specific actions in the set to take when selected conditions or combinations of conditions are true. Sometimes notes are added below the table of indicate when to use the table or to distinguish it from other decision tables.

Condition	Decision Rule
Condition Statement	Condition Entry
Action Statement	Action Entries

**Building decision table :**

To develop decision table analyst should use the following steps :

- ◆ Identifies the conditions in the decision. Each condition selected should have the potential to either occur or not occur, partial occurrences is not possible.

- ◆ Determine the actions.
- ◆ Study the combinations of conditions that are possible.  
For N conditions there are  $2^n$  combinations.
- ◆ Fill in the table with decision rules.
- ◆ Mark the action entries with X to signal action to take, leave a cell blank for no action applies.
- ◆ Examine the table for redundant rules or for contradictions within rules.

There are four forms of Decision Table which are as follows :

- (1) Limited-Entry Form
- (2) Extended-Entry Form
- (3) Mixed-Entry Form
- (4) ELSE Form

(1) **Limited-Entry Form** : The form consists of only Y, N and blank entries, in a limited entry form. The condition entries are marked by Y or N and the action entries are marked by X or blank.

e.g. Let us take an example of Sales policy of a company. This company offers discount of 4% on sales of more than Rs. 10000/- and payment made within 10 days. If the sales to customer is more than 5000/- and less than 10000/- Rs. And payment made within 10 days then 3% discount is offered. If the sales is below Rs.5000/- and payment within 10 days then 2% discount is offered. If the payment is made after 10 days no discount is offered irrespective of the sales to customer.

Condition	Decision Rules					
Within 10 days	Y	Y	Y	N	N	N
> 10,000	Y	N	N	Y	N	N
5,000 to 10,000	N	Y	N	N	Y	N
Below 5,000	N	N	Y	N	N	Y
4% Discount	X					
3% Discount		X				
2% Discount			X			
Full Payment				X	X	X

### Limited Entry Form

(2) **Extended Entry Form** : Extended Entry form consists of the main criteria in left side and the detailed Conditions and Actions on the right side.

The previous example can be shown in Extended Entry form as follows :

Condition	Decision Rules					
Time	Within 10 days	Within 10 days	Within 10 days	After 10 days	After 10 days	After 10 days
Business volume	$\geq 10000$	5000 to 10000	<5000	$\geq 10000$	5000 to 10000	$\geq 10000$
Action	4% dis	3%dis	2%dis	Full Pay.	Full Pay.	Full Pay.

### Extended Entry Form

(3) **Mixed Entry Form** : This is a combination of Limited Entry and Extended Entry Form. In this form, the condition part follows the Extended Entry format whereas the action part follows the Limited Entry format.

Condition	Decision Rules					
	Within 10 days	Within 10 days	Within 10 days	After 10 days	After 10 days	After 10 days
Time	Within 10 days	Within 10 days	Within 10 days	After 10 days	After 10 days	After 10 days
Business Volume	$\geq 10000$	5000 to 10000	<5000	$\geq 10000$	5000 to 10000	$\geq 10000$
4% disc.	X					
3% disc.		X				
2% disc.			X			
Full Pay.				X	X	X

### Mixed Entry Form

(4) Else Form : This form is used to remove the repeated actions from the Decision Table. Some Action Entries are repeated according to different condition statements. Else form is used in such a condition.

Condition	Decision Rules			
Time	Within 10 days	Within 10 days	Within 10 days	ELSE
Business volume	$\geq 10000$	5000 to 10000	<5000	
4% disc.	X			
4% disc.		X		
4% disc.			X	
Full Payment				X

### Else Form

Structured English :

It is another method to explain condition and actions in decisions and procedure. This method does not show decision rules, but it states them. This method allows analyst to list steps in the order in which they must be taken. It does not use any special symbols or formats. Using this method, entire procedure can be stated quickly, since English like statement are used.

To describe a process, Structured English uses three basic types of statements :

(1) Sequence Structure

(2) Decision Structure

(3) Iteration Structure

**(1) Sequence Structure :** It is a single step or action included in a process. It does not depend on the existence of any condition and when encountered, it is always taken. More than one sequence instructions are used together to describe a process.

For example to issue a book from library follow the following steps :

- ◆ Pick up a book
- ◆ Take the book to the issue counter
- ◆ Perform the entry in user register
- ◆ Take the book
- ◆ Leave the library

The above example shows a sequence of steps, none of the steps contains a decision.

**(2) Decision Structure :** Decision Structure occurs when two or more action can be taken depending on the value for a specific condition. One must assess the condition and then make the decision to take the

stated actions or sets of actions for that condition. Once the determination of the condition is made the actions are unconditional.

**Consider the above example :**

IF a desired book is found THEN

Pick up a book

Take the book to the issue counter

Perform the entry in user register

Take the book

Leave the library

OTHERWISE

Put the demand

Leave the library

ENDIF

**(3) Iteration structure :** In routine operating activities, it is common to find that certain activities are repeated while a certain condition exists or until a condition occurs.

DO WHILE still examining more books

IF a desired book is found THEN

Pick up a book

Take the book to the issue counter

Perform the entry in user register

Take the book

Leave the library

OTHERWISE

Put the demand

Leave the library

ENDIF

ENDDO

Structured English can be useful to describe conditions and actions clearly. It offers a concise way of summarizing a procedure, where decisions must be made and actions taken.

3. List out the activities of SDLC. Explain Preliminary Investigation in detail.

Ans. System Development Life Cycle is a classical thought of as the set of activities that analysts, designers, and users carry out to develop and implement an information system. SDLC consist of the following six activities :

- ◆ Preliminary investigation
- ◆ Determination of system requirement
- ◆ Design of system
- ◆ Development of software
- ◆ System testing
- ◆ Implementation and evaluation

#### **Preliminary investigation :**

There may be many Project Requests from different sources. All the projects cannot be executed due to constraints. Preliminary Investigation is done with the objective of screening the requests and suggesting feasible projects.

A request is made by a manager, an employee or a system specialist for information system. From this point the first system activity, the preliminary investigation starts. It consists of three parts :

- (1) **Request clarification :** The users or the persons who wants the information system, their request are not clear, therefore before any system investigation can be consider, the project request must be examined to determine precisely what the originator wants.

(2) **Feasibility Study** : When ever any user request is clarified, then it is very much important to determine whether the system request is feasible or not. There are three aspects in the feasibility study i.e.

**Technical Feasibility** : Can the work for the project be done with current equipment, existing software technology and available person?

**Economic Feasibility** : Are there sufficient benefits in creating the system to make the cost acceptable?

**Operational Feasibility** : Will the system be used if it is developed and implemented ?

The feasibility study is carried out by a small group of people who are familiar with information system techniques as well as the routine and detail activities of the organization.

(3) **Request Approval** : All requested projects are not desirable or feasible. However, those projects that are both feasible and desirable should be put into a schedule. If the systems developer are free then the development process will be immediately started otherwise, the proposal will be put into the priority queue depending upon the importance.

## Q.2 (A) Explain the following :

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### 1. What are the types of output ?

**Ans.** Whether the output is a formatted report or a simple listing of the contents of a file, a computer process will produce the output. System output may be :

- ◆ A Report.
- ◆ A Document.
- ◆ A Message.

- Output contents originate from these sources :
  - ◆ Retrieval from a data store
  - ◆ Transmission from a process or system activity
  - ◆ Directly from a input source

- Key Output Questions :

Five questions answered fully and properly help system analysts learn a great deal about what the output of a newly designed information system should be :

- ◆ Who will receive the output ?
- ◆ What is its planned use ?
- ◆ How much detail is needed ?
- ◆ When and how often is the output needed ?
- ◆ By what method ?

System Analyst should answer these questions for every output requirement.

## 2. What is the use of Data Validation ?

Ans. Valid transactions can also contain invalid data. Data Validation is required to check for validity of data that is input. Some tests are required to validate data that are as follows :

- ◆ Existence test.
- ◆ Limit and Range tests,
- ◆ Combination Test.

## 3. What is the difference between Significant and Non-Significant Code ?

Ans. (1) **Significant Code** is a meaningful code which can be assigned numbers in sequence, starting with the first and proceeding in a sequential manner to the last. It may also consist of a prefix to describe the type of item; S for Steel or P for Plastic.

The codes can be divided into subsets subcodes, characters that are part of the identification number and have special meaning.

- (2) **Non-Significant Code** may use letters and symbols from the product to describe it in a way that communicates visually, e.g. MCA or CS or BCA stand for Master of Computer Application or Computer Science or Bachelor of Computer Application.

**Q.2 (B) Answer the following (Any Two) :**

1. Explain the basic principle of code design.

- Ans.  The principles that guide Software Design are
- (1) **Modularity and Partitioning** : Each System should consist of a hierarchy of modules. The module partitioning is done according to specific functions
  - (2) **Coupling** : Coupling refers to the strength of relation between modules. Loose Coupling is recommended.
  - (3) **Cohesion** : Cohesion refers to the strength of relations within a module. The data elements within a module should be strongly bound.
  - (4) **Span of Control** : Span of Control refers to the number of Modules subordinate to calling module. The span of control should be limited to 5 to 7 modules. Modules should interact with and manage the functions of a limited number of lower level modules.
  - (5) **Size** : The number of instructions comprising a module. Module size should be generally small.
  - (6) **Shared Use** : Shared Use refers to use of Module by other calling Modules. Functions should not be duplicated in separate modules but established in a single module that can be invoked by any other module when needed.

2. What is CASE ? Explain components of case tools in detail.

Any device that when used properly will improve the performance of a task is called Tool.

Computer Aided System Engineering Tools is used to automate the key aspects of the entire system development process from beginning to end.

**CASE Components :**

- (1) **Diagramming Tools**
- (2) **Centralized Information Repository**
- (3) **Interface Generators**
- (4) **Code Generators**
- (5) **Management Tools**

(1) **Diagramming Tools** : Diagramming Tools support analysis and documentation of application requirements. They include capabilities to produce DFD, Data Structure Diagrams and Program Structure Charts.

They support the capability to draw diagrams and charts and to store the details internally.

- (2) **Centralized Information Repository** : The capture, analysis, processing and distribution of all systems information is aided by a centralized information repository or data dictionary. The dictionary contains details of System Components such as data items, data flows and processes including information describing volume and frequency of each activity.
- (3) **Interface Generators** : System Interfaces are the means by which users interact with the application either to enter information and data or to receive the information.

Interface Generators provide the capability to prepare mock-ups and prototypes of User Interfaces. They support rapid creation of demonstration system menus, presentation screens and report layouts.

(4) **Code generators** : Code Generators automate the preparation of Computer Software. They incorporate methods that allow the conversion of System Specifications into executable source code. The best generators will produce approximately 75% of the source code for an application.

(5) **Management Tools** : This CASE component assists development managers in the scheduling of analysis and design activities and allocation of resources to different project activities. Some CASE management tools allow project managers to specify custom elements.

#### Benefits of CASE :

- ◆ Easing Revision of Applications
- ◆ Support of System Prototyping
- ◆ Code Generation
- ◆ Improved Ability to meet user requirement
- ◆ Support Iterative Development Process

#### Weaknesses of CASE :

- ◆ Reliance on Structured Method
- ◆ Absence of Standard Levels of Methodology Support
- ◆ Conflicting Use of Diagrams
- ◆ Diagrams Not Used
- ◆ Limited Function
- ◆ Limited Scope
- ◆ Human Task Remain Critical

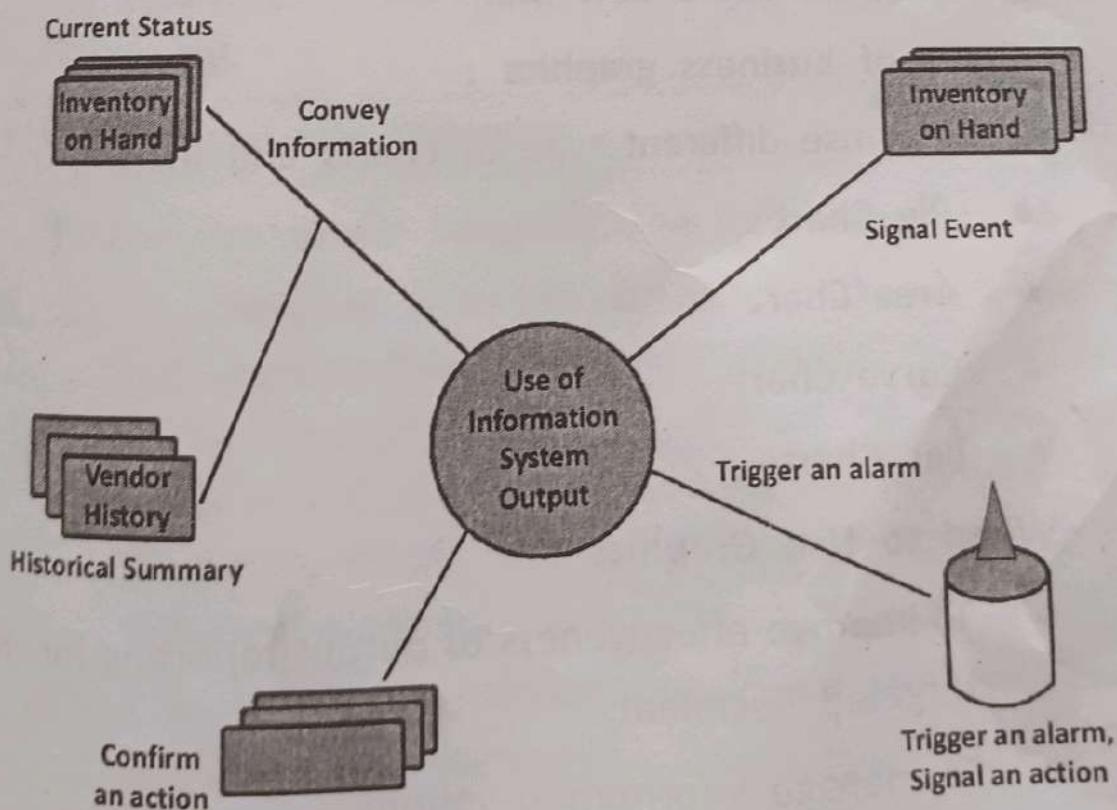
**3. Write a short note on Output Media.**

Ans. The term Output applies to any information produced by an information system, whether printed or displayed. When analysts design computer output they :

- ◆ Identify specific output needed to meet the information requirements.
- ◆ Select methods for presenting information.
- ◆ Create document, report or other formats that contain information produced by system.

The output from an information system should accomplish one or more of following objectives :

- ◆ Convey information about past activities, current status or projection of future.
- ◆ Signal important events, opportunities, problems or warnings.
- ◆ Trigger an action.
- ◆ Confirm the action.



## How to Present Information :

- (1) Tabular Format
- (2) Graphic Format
- (3) Designing Printed Output

### Tabular Format :

The tabular format used under the following conditions:

- ◆ Details dominate and few narrative comments or explanation are needed.
- ◆ Details are presented in discrete categories.
- ◆ Each category must be labeled.
- ◆ Totals must be drawn or comparisons made between components

### Graphic Format :

Graphics System is available across a wide range of prices and capability and for PC to mainframes. Business graphics is not a new area.

#### Types of business graphics :

It make use different type of charts and maps .

- ◆ Pie Chart
- ◆ Area Chart
- ◆ Curve Chart
- ◆ Bar Charts

#### When to Use Graphics :

- ◆ To improve effectiveness of output reporting for the targeted Recipient.
- ◆ To manage information volume.
- ◆ To suit personal preferences.

**Designing Printed Output :**

**Printed Reports :**

Printed Output Methods

Special Form

Turnaround Document

Multiple Copies of Output

**There are two types of Multi part Forms :**

(a) **Carbonless Copies** : Multiple Copies using Carbonless paper are possible because of a special chemical coating on the back side of each copy except the last. The coating causes the image to appear on the copies underneath.

(b) **Interleaved Carbon Copies** : Carbon paper suitable for one-time use is interleaved between each sheet of paper.

**Turnaround Documents :**

If the firm used optical scanners capable of reading printed or handwritten forms, then a paper statement can be prepared by the system and used as a turnaround document.

**Q.3 (A) Explain the following : 05**

**1. Define the terms Coupling and Cohesion.**

Ans. (1) **Coupling** refers to the strength of the relationship between modules of a System. Good Designers seek to develop structure of a system such that one module has little dependence on any other module. Loose Coupling minimizes the interdependence between modules.

(2) **Cohesion** refers to the strength of relations within a module. Strong Cohesion is recommended between various elements within a module.

**2. What is Data Verification ?**

**Ans.** Verification is intended to find errors in data. The data is input in a simulated environment so that errors in data can be verified and corrected.

**3. Define Structured Flow Chart.**

**Ans.** Structured Flow Charts also called Nassi Schneiderman Charts are graphic tools that force the designer to structure software that is both modular and top-down. They consist of three basic elements :

- ◆ Process.
- ◆ Decision.
- ◆ Iteration.

**4. What is System Implementation ?**

**Ans.** System Implementation includes all those activities that take place to convert from the old system to new system. Proper Implementation is essential to provide a reliable system to meet organization requirements.

**5. List out the types of Documentations.**

**Ans.** A System cannot be completely effective unless it is adequately documented. Instructions and narrative descriptions must be prepared for every phase and part of the system logic, tunings, user instructions, guidelines for operations staff and instructions relating to transmission of data and results.

**Types of Documentation are :**

**Program Documentation :**

System Analyst must provide programmer with required documentation in terms of flowchart, decision table etc. Four items constitute normal documentation required for each program :

- ◆ Copying in final form of all input/output documents.
- ◆ Statement of Standards for coding structures and input/output layouts.
- ◆ Clarification of the programs interface with other related programs.
- ◆ General Flowchart or Decision Table.

Programmer's responsibility in documentation is to provide information to enable future programmers to make necessary changes.

#### **Operation Documentation :**

A well designed system may run for a long time with little or no assistance from the systems department. It is a collection of operator instructions for each program at an installation and typically contains :

- (1) Narrative describing the run.
- (2) Listing of the programmed error conditions.
- (3) Detailed information for running the job including
  - ◆ Input/Output forms to be used.
  - ◆ Anticipated Problem areas and how to handle them.
  - ◆ Detailed description of file assignment of each I/O device.
  - ◆ Disposition of data files after completing the job.
  - ◆ General Block Diagram of Programming Logic.
  - ◆ Restart Procedures.

#### **User Documentation :**

System users require documentation to prepare a developing system and to smoothly carry out existing ones. The manual should supply the following information:

- ◆ General Flowchart of the System.
- ◆ Assignment of responsibility for specific tasks.
- ◆ Standards for work flow, including target dates and deadlines for specific tasks.
- ◆ Simple Input and Output documents.
- ◆ Detailed Procedures.
- ◆ Anticipatory exceptions and instructions on how to handle them.
- ◆ Accuracy standards for data in the System.

#### □ Management Documentation :

The Documentation required by Corporate management differs quite a lot from that required by users. The system designer must know the requirements of the management and provide documentation to enable management to perform three functions :

- ◆ Evaluate progress on Systems development.
- ◆ Monitor existing systems.
- ◆ Understand the objectives and methods of new and existing systems.

A brief manual highlighting the key steps in each system may be prepared for management.

#### □ Systems Documentation :

The written system's request is merely a statement of the user's problem. The Selection Committee must specify the following :

- ◆ The objectives of impending feasibility study.
- ◆ The extent of authority of feasibility team.
- ◆ The individual or group responsible for completing the study.

A feasibility report is the most important form of documentation containing :

- ◆ It defines the objectives of the proposed system's change in reasonable detail after a sufficiently detailed study.
- ◆ It gives a plan to attain these objectives.

During System Design, the designing team produces the following forms of documentation :

- (1) **File Specification** : Detailed definitions of each file in the system, best done in graphic form.
- (2) **Transaction Specification** : Detailed descriptions of each type of input in the system, including a layout of each transaction and narrative description of how it is used.
- (3) **Output Specifications** : Detailed descriptions of all output anticipated from the System.

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**Q.3 (b) Answer the following (Any two) : 12**

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1. **What is Testing ? Explain the level of Testing in detail.**

**Ans.** Testing is the process of executing a program with the explicit intention of finding errors i.e. making the program fail. A successful test is one that finds an error. System Testing is expensive and critical process as it can consume 50% of the total budget for Software development.

**Levels of Testing :**

Levels of Testing are :

- (1) **Unit Testing.**
- (2) **Systems Testing.**
- (3) **Special System Tests.**

**Unit Testing :**

In Unit Testing, analyst tests the programs making up Software. Unit Testing first focuses on the modules independently on one another to locate errors.

Unit Testing can be performed from bottom-up starting with the smallest and lowest level modules and proceeding one at a time. This is called Bottom-up testing.

Top-down testing begins with the upper-level module. A Stub is a module Shell that can be called by the upper level module and that when reached properly will return a message to the calling module indicating that proper interaction occurred.

**Systems Testing :**

System Testing tests the integration of each module in the System. The primary concern is the compatibility of each module in the System. System Testing must also verify that file sizes are adequate and that indices have been built properly.

 **Special System Tests :**

There are other tests called Special System Tests focusing on particular criteria. The Special System Tests are as follows :

(1) **Peak Load testing :** This test determines if the system will handle the volume of activities that occur when the system is at the peak of processing demand. e.g. Peak banking hours.

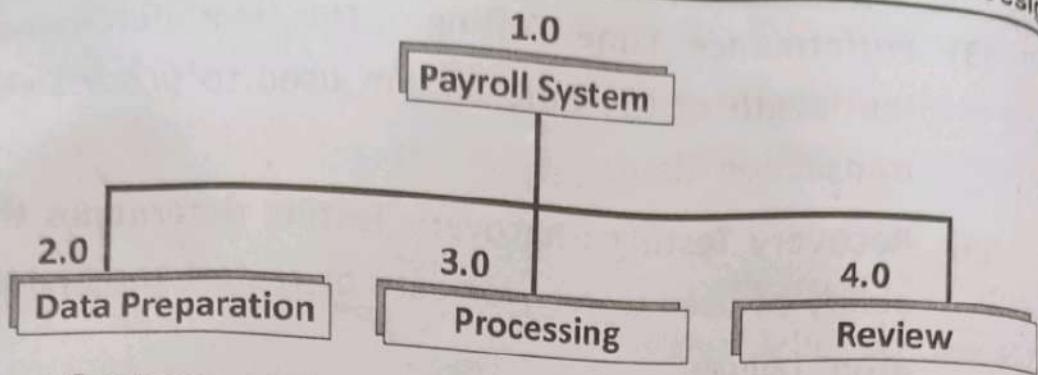
(2) **Storage Testing :** This test determines the capacity of the System to store transaction data on disk or other files.

- (3) **Performance Time Testing** : This test determines the length of the time system used to process the transaction data.
- (4) **Recovery Testing** : Recovery Testing determines the ability of user to recover data or restart the system after failure.
- (5) **Procedure Testing** : Procedure testing determines clarity of documentation on operation and use of the System by having users do exactly what manuals request.
- (6) **Human Factors Testing** : Human Factors Testing determine how users will use the System when processing data or preparing reports.

**2. Write a short note on HIPO Diagram.**

**Ans.** HIPO stands for Hierarchical Input Process Output. HIPO diagram are graphic rather than prose or narrative description of system.

- They assist analysts in answering 3 questions :**
  - ◆ What does system or module do ?
  - ◆ How does it do it ?
  - ◆ What are the inputs and outputs ?
- HIPO Diagram consist of :**
  - ◆ Visual Table of Contents (VTOC)
  - ◆ Functional Diagrams.
- Visual Table of Contents (VTOC) :**
  - ◆ Shows the relation between each of the documents.
  - ◆ Consists of an Hierarchy Chart that identifies the modules in a system & their relation with each other.



Contents of the module like brief description of what the modules does.

**Functional Diagrams :**

- ◆ One diagram for each box in VTOC.
- ◆ Each diagram shows input & output, major processes movement of data & control points.
- ◆ Traditional Flowchart Symbols represent media such as magnetic tape, printed output etc.
- ◆ Solid arrow shows control paths, open arrow identifies data flow.

**3. What is Conversion? Describe each conversion method with its advantage and disadvantage.**

**Ans.** Conversion is the process of changing from the old system to new system. The conversion methods are:

- (1) Parallel Conversion.
- (2) Direct Cut-over.
- (3) Pilot Method.
- (4) Phase-in Method

**Parallel Method :** In this approach the old and new system are operated together. This method is the safest conversion method as it guarantees that the organization can still fall back to the old system without loss of time, revenue or service.

**Advantages :**

- ◆ Offers greatest security.
- ◆ Old System can take over if new system fails.
- ◆ Very useful method for heavy online transactions.

**Disadvantages :**

- ◆ It doubles operating costs as both the old and new systems operate.
- ◆ The new system may not get fair trial.

 **Direct Cut-over Method :**

Direct Cutover Method converts abruptly from old to new system. The old system is used till today evening and tomorrow morning onwards new system operates. The old system is discontinued immediately and new one started.

**Advantages :**

- ◆ Forces user to make the new system work.
- ◆ There are immediate benefits from new methods and controls.

**Disadvantages :**

- ◆ No system to fall back on in case the new system is not successful.
- ◆ Requires the utmost planning.

 **Pilot Method :**

In this method working version of system implemented in one part of the organization. Once the feedback is received, changes are made and system is installed in other parts of the organization.

### Advantages :

- ◆ Provides experience and live test before implementation.
- ◆ This method useful for new developers with little experience.

### Disadvantages :

- ◆ May give the impression that the System is unreliable and error-prone.
- ◆ Biased approach by some employees may not allow fair trial for the new system.

## □ Phase-in Method :

This method is used when it is not possible to install a new system throughout an organization all at once. The conversion of files, training of personnel or arrival of equipment may force the staging of the implementation over a period of time, ranging from weeks to months.

### Advantages :

- ◆ Allows some users to take advantage of system early.
- ◆ Allows training and installation without unnecessary use of resources.

### Disadvantages :

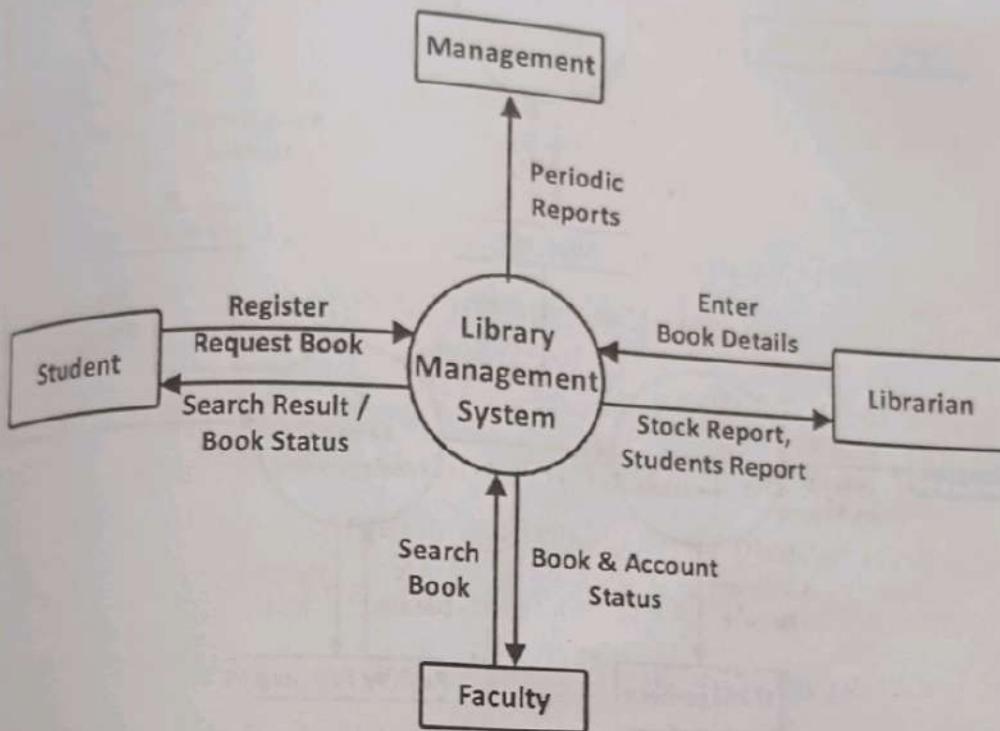
- ◆ Cost of implementation is high.
- ◆ Over enthusiasm, resistance and lack of fair trial.

**Q.4 Explain Context Level and all other levels of DFD for Library System and also define input, output and processes for Library System.**

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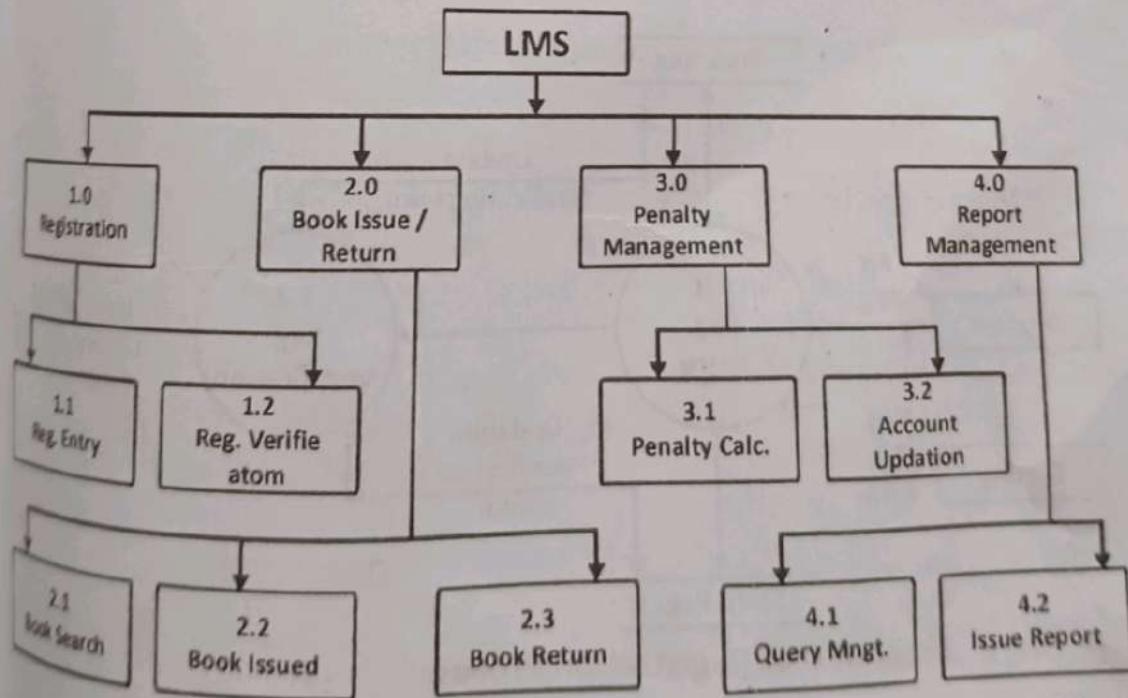
Ans.

**Library Management System :**



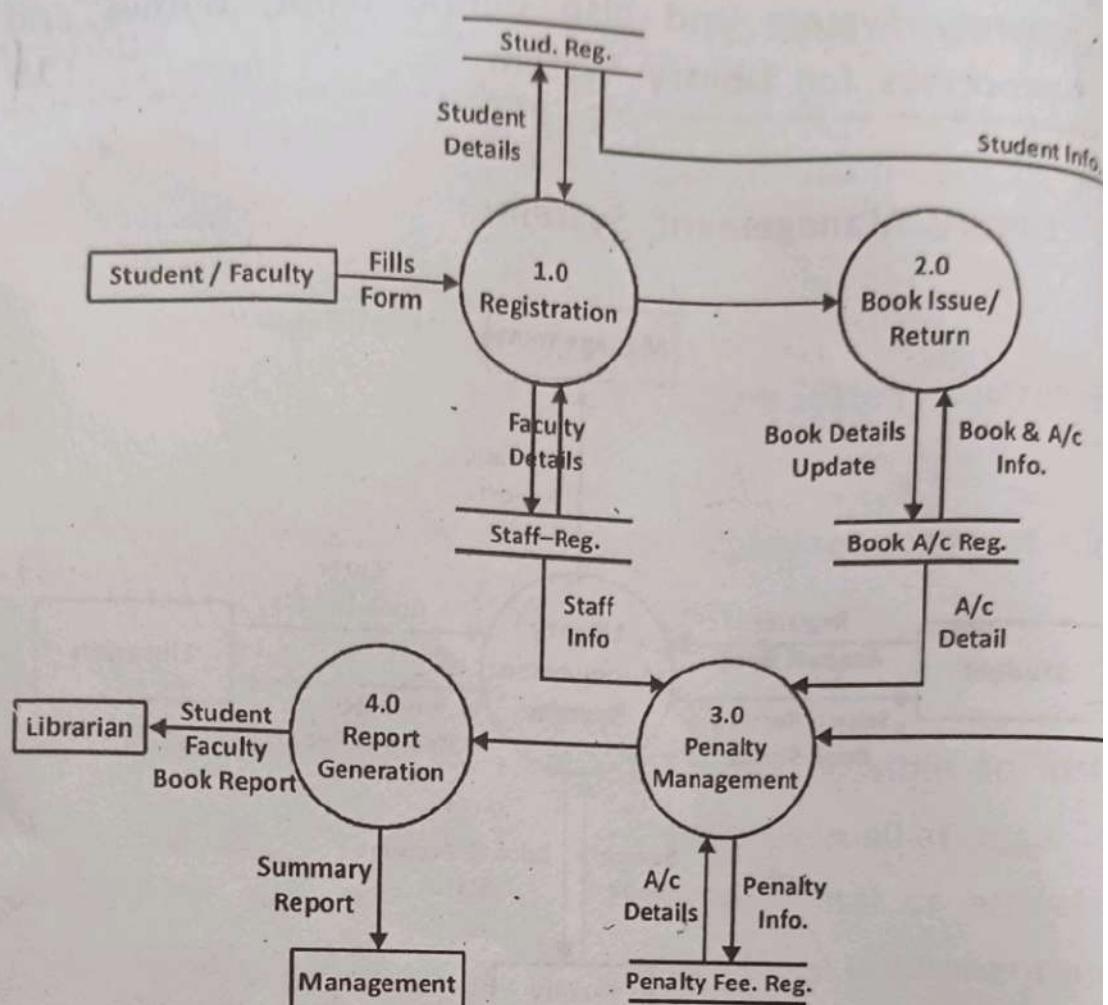
Context Level Diagram

**LMS :**



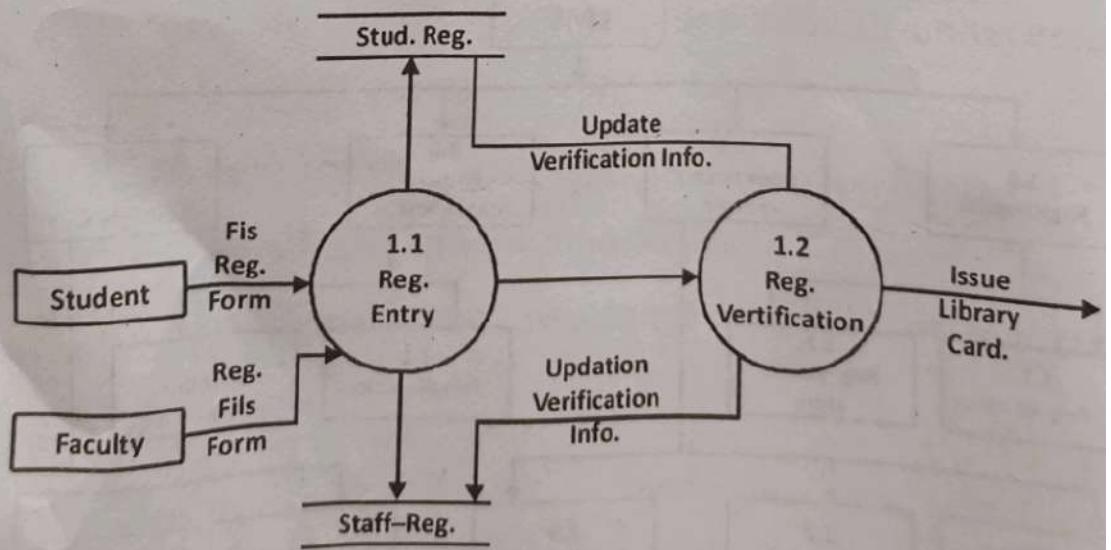
LMS Hierarchy Flow

1<sup>st</sup> Level DFD of LMS

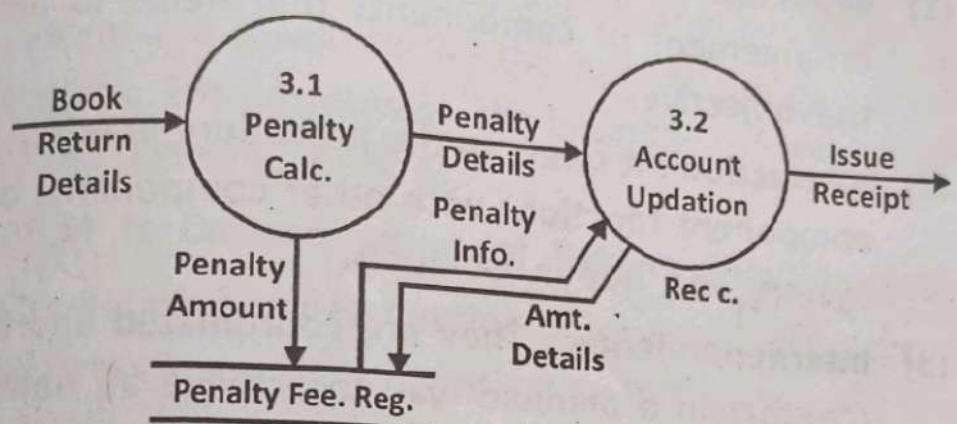
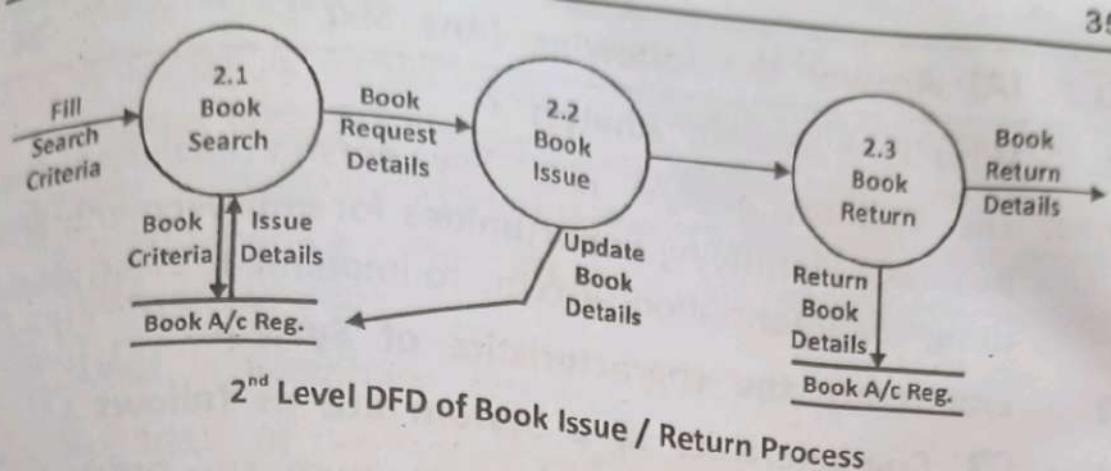


1<sup>st</sup> Level DFD of LMS

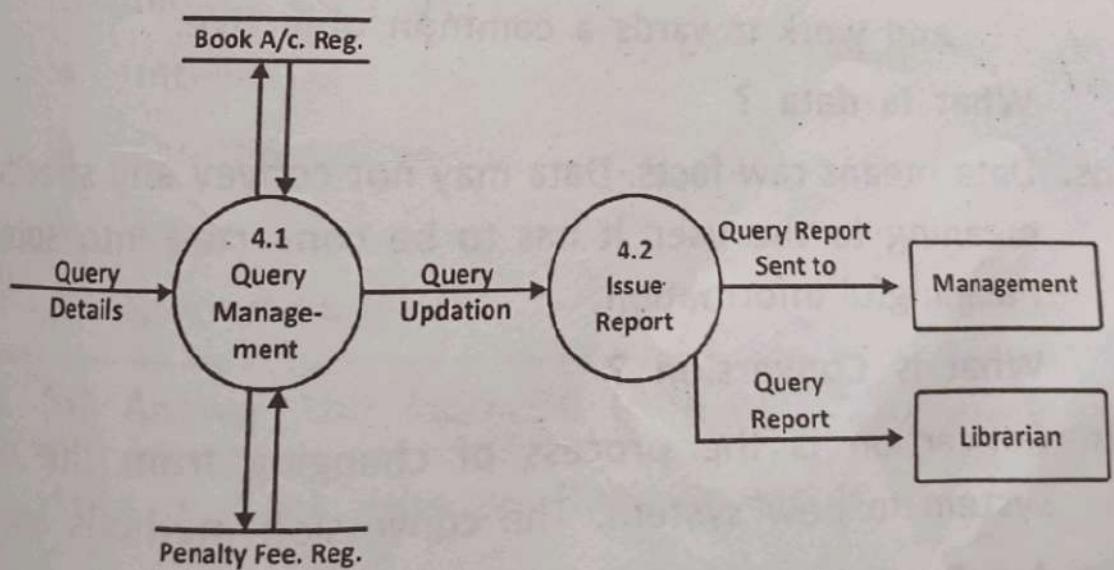
2<sup>nd</sup> Level DFD of LMS



2<sup>nd</sup> Level DFD of Registration Process



**2<sup>nd</sup> Level DFD of Penalty Management**



**2<sup>nd</sup> Level DFD of Report Management**

**OR**

**Q.4 (A) Answer the following (Any Six) :**

**1. Who is a System Analyst ?**

**Ans.** The systems analyst is a key person analyzing the business, identifying opportunities for improvement, and designing information systems to implement these ideas.

**2. Enumerate the characteristics of System.**

**(1) Organization** : It implies structure and order. It is arrangement of components that helps to achieve the objectives.

**(2) Interaction** : It refers to the procedure in which each component functions with other components of the System and not in isolation.

**(3) Interdependence** : They are coordinated and linked together in a planned way to achieve an objective. Components depend upon each other.

**(4) Integration** : Integration is concerned with how a system is tied together.

**(5) Central Objective** : All the components are focused and work towards a common objective.

**3. What is data ?**

**Ans.** Data means raw facts. Data may not convey any specific meaning to the user. It has to be converted into some meaningful information.

**4. What is Conversion ?**

**Ans.** Conversion is the process of changing from the old system to new system. The conversion methods are:

- ◆ Parallel Conversion.
- ◆ Direct Cut-over.
- ◆ Pilot Method.
- ◆ Phase-in Method.

**5. What is System ?**

Ans. A system is simply a set of related components which interact with each other to accomplish some purpose or specific objective. System is derived from the Greek word **Systema** which means an organized relationship among functioning units.

**6. What is Boundary ?**

Ans. Boundary of the System can be defined as the scope of the System. The entities within the boundary of the System are governed by the System are called Internal Entities. Entities outside the boundary of the System are called External Entities.

**7. What is Determination of System Requirements ?**

Ans. The detailed understanding of all important facts of the business area under investigation is the key point or heart of the system analysis. The analyst must study the business process, so that the questions related to study, can be answered. Fact finding techniques are used to understand the System Requirements. Fact finding techniques used are :

- Interviews.
- Questionnaires.
- Observation.
- Record Review.

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**Q.4 (b) Answer the following (Any two) : 12**

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**1. Write a short note on Decision Table.**

Ans. A decision table is a matrix of rows and columns, rather than a tree, that shows conditions and actions. Decision rules, included in a decision table, state what procedure to follow when certain conditions exists.

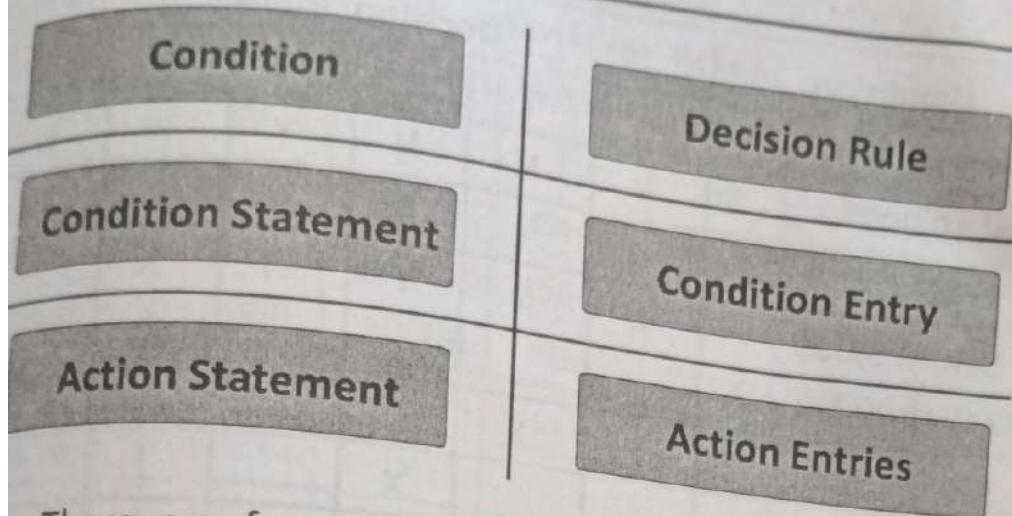
**The decision table is made up of four sections :**

Condition statements, condition entry, action statements, action entries. The condition statement identifies relevant conditions. Condition entries tell which value, if any applies for a particular condition. Action statements list the set of all steps that can be taken when a certain condition occurs. Action entries show what specific actions in the set to take when selected conditions or combinations of conditions ate true. Sometimes notes are added below the table of indicate when to use the table or to distinguish it from other decision tables

**Building decision table :**

To develop decision table analyst should use the following steps :

- ◆ Identifies the conditions in the decision. Each condition selected should have the potential to either occur or nor occur, partial occurrences is not possible.
- ◆ Determine the actions.
- ◆ Study the combinations of conditions that are possible. For N conditions there are  $2^n$  combinations.
- ◆ Fill in the table with decision rules.
- ◆ Mark the action entries with X to signal action to take, leave a cell blank for no action applies.
- ◆ Examine the table for redundant rules or for contradictions within rules.



There are four forms of Decision Table which are as follows :

- (1) Limited-Entry Form
- (2) Extended-Entry Form
- (3) Mixed-Entry Form
- (4) ELSE Form

**(1) Limited-Entry Form :** The form consists of only Y, N and blank entries, in a limited entry form. The condition entries are marked by Y or N and the action entries are marked by X or blank.

e.g. Let us take an example of Sales policy of a company. This company offers discount of 4% on sales of more than Rs. 10000/- and payment made within 10 days. If the sales to customer is more than 5000/- and less than 10000/- Rs. And payment made within 10 days then 3% discount is offered. If the sales is below Rs.5000/- and payment within 10 days then 2% discount is offered. If the payment is made after 10 days no discount is offered irrespective of the sales to customer.

Condition	Decision Rules					
Within 10 days	Y	Y	Y	N	N	N
> 10,000	Y	N	N	Y	N	N
5,000 to 10,000	N	Y	N	N	Y	N
Below 5,000	N	N	Y	N	N	Y
4% Discount	X					
3% Discount		X				
2% Discount			X			
Full Payment				X	X	X

### Limited Entry Form

(2) Extended Entry Form : Extended Entry form consists of the main criteria in left side and the detailed Conditions and Actions on the right side. The previous example can be shown in Extended Entry form as follows :

Condition	Decision Rules					
Time	Within 10 days	Within 10 days	Within 10 days	After 10 days	After 10 days	After 10 days
Business volume	$\geq$ 10000	5000 to 10000	<5000	$\geq$ 10000	5000 to 10000	$\geq$ 1000
Action	4% dis	3%dis	2%dis	Full Pay.	Full Pay.	Full Pay.

### Extended Entry Form

(3) Mixed Entry Form : This is a combination of Limited Entry and Extended Entry Form. In this form, the condition part follows the Extended Entry form whereas the action part follows the Limited Entry format.

Condition	Decision Rules					
	Within 10 days	Within 10 days	Within 10 days	After 10 days	After 10 days	After 10 days
Time						
Business Volume	$\geq$ 10000	5000 to 10000	<5000	$\geq$ 10000	5000 to 10000	$\geq$ 10000
4% disc.	X					
3% disc.		X				
2% disc.			X			
Full Pay.				X	X	X

**Mixed Entry Form**

(4) **Else Form** : This form is used to remove the repeated actions from the Decision Table. Some Action Entries are repeated according to different condition statements. Else form is used in such a condition.

Condition	Decision Rules			
	Within 10 days	Within 10 days	Within 10 days	ELSE
Time	Within 10 days	Within 10 days	Within 10 days	ELSE
Business volume	$\geq 10000$	5000 to 10000	<5000	
4% disc.	X			
3% disc.		X		
2% disc.			X	
Full Payment				X

**Else Form**

**2. Write down the role of System Analyst.**

**Ans.** A business professional who uses analysis and design techniques to solve business problems using information technology.

**Role of a System Analyst :**

- ◆ Defining Requirement.
- ◆ Prioritizing Requirement by Consensus.
- ◆ Gathering data, facts & opinions of users.
- ◆ Analysis & Evaluation.
- ◆ Solving problems.
- ◆ Drawing up Specifications.
- ◆ Designing Systems.
- ◆ Evaluating Systems.

**System Analyst's approach to Problem Solving :**

- ◆ Research and understand the problem.
- ◆ Verify benefits of solving problem outweigh the costs.
- ◆ Define the requirements for solving the problem.
- ◆ Develop a set of possible solutions (alternatives).
- ◆ Decide which solution is best and recommend.
- ◆ Define the details of the chosen solution.
- ◆ Implement the solution.
- ◆ Monitor to ensure desired results.

**3. Write down types of System in detail with live examples.**

**Ans.** The common classification of System are as follows :

- (1) Physical or Abstract Systems.
- (2) Open or Closed Systems.
- (3) Deterministic or Probabilistic Systems.
- (4) Man-made Information Systems.

**Physical or Abstract Systems :**

physical Systems are tangible entities that may be static or dynamic in operation. e.g. Computer is Physical System.

Abstract Systems are conceptual or non-physical entities which may be relationship among sets of variables or models. e.g. Mathematical Model or Model of a space shuttle.

**Open or Closed System :**

Open System are those systems that are affected by external and internal factors. Systems that interact with their environment are called Open Systems. They receive input from and deliver output to the surroundings. e.g. Any System in real life as Business System is an Open System. Education System is an Open System.

Closed Systems are those systems which are acted upon by only internal factors. Systems that do not interact with the environment are called Closed Systems. There is no effect of external forces on the System. Closed System is isolated system which is not practically possible in real life.

**Deterministic or Probabilistic Systems :**

A Deterministic System is one in which the occurrence of all events is perfectly predictable. The next state of the System can be accurately predicted. e.g. Numerically controlled machine tool is an example of Deterministic System.

Probabilistic System is one in which the occurrence of events cannot be perfectly predicted. e.g. Warehouse and its contents.

**Man-made Information Systems :**

Information System is the basis for interaction between the user and the analyst. It determines the nature of relationship among decision makers. Information System can be defined as a set of devices, procedures and operating systems designed around user-based criteria to produce information and communicate it to the user for planning, control and performance. Information Systems are classified into :

(1) **Formal Information Systems.**

(2) **Informal Information Systems.**

(3) **Computer based Information Systems.**

(1) **Formal Information Systems :** Formal Information System is based on the organization represented by the organization chart. It is concerned with the pattern of authority, communication and work flow.

(2) **Informal Information Systems :** Informal Information System is an employee based system designed to meet personnel and vocational needs to help in the solution of work-related problems. It works within the framework of the business and its stated policies.

(3) **Computer based Information Systems :** System Analysts develop several different types of Information Systems to meet a variety of business needs. This class of Systems is known as CBIS or Computer based Information Systems. This can be further sub classified as :

- ◆ Transaction Processing Systems (TPS).
- ◆ Management Information Systems (MIS).
- ◆ Decision Support Systems (DSS).
- ◆ Office Automation Systems (OAS)

