Chapter -5

DESIGN AND DEVELOPMENT OF UNIVERSITY HUMAN RESOURCE INFORMATION SYSTEM (UHRIS): THE PROPOSED MODEL
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DESIGN AND DEVELOPMENT OF UNIVERSITY HUMAN RESOURCE INFORMATION SYSTEM (UHRIS): THE PROPOSED MODEL

The study of the manual system of human resource functions of the Establishment section of Dr. Hari Singh Gour University identified various problems. The application of automated Human Resource System (HRIS) is also considered for regarding these problems to a large extent. This chapter has focused on the designing and development aspect of University Human Resource Information System (UHRIS) as a proposed automated model for achieving efficiency of the Establishment Section.

5.1 SYSTEM DESIGN PROCESS

The main objective of the design phase is to produce a model of the system. The system design phase has two levels – top level design and detailed design. In the top level design, the system is broken down into different modules, while in detailed design the focus is given on the internal design of each module. The detailed design aspects described the system in a manner to activate the development phase of computer based system. To develop the system the most popular methodology i.e. structured methodology has been used. The structured methodology is a data flow based methodology. In this methodology, the software is considered as a transformation function that converts the given input into desired output. The Structured design divides the system into different modules which are arranged in hierarchy and organized in top-down manner. The main objective of the structured design is to reduce the coupling and enhance the cohesion between different modules. The design process is an exercise of specifying “how” the system will work. It is an interactive process which is based on “what” the system will do. Generally the following are included in the system design process.

(i). Output Design

The starting point of the design process is the proper knowledge of system requirements which will normally be converted into outputs. Output design is the process of design the format of all printed output which is commonly called hard copy.

(ii). Input Design

Once the output requirement have been finalized, the next step is to find out data need which is to be made available to the system to produce the desired output as well as the sequence of input
data i.e. design of input data entry screen (forms). Input design is the process of converting user-originated input format to a computer based format.

(iii). Database Design

Once the input data is captured in the system, these may have to be preserved either for short or long range period. The data is stored in the database under various tables (electronic files) in a logical manner. The database is the heart of the information system. The Data Base is a collection of inter-related tables (files). The Table is a collection of records and the record is a collection of related data items. Under the database and file designing the following activities are undertaken.

- **Normalization** Before design of table structure it is essential to normalize the database table. The Normalization is a process of refining database structure to improve the speed at which data can be accessed and database integrity can be enhanced. Well normalized tables are easy to understand when we look at them. It is easy to see what kind of data they store and what types of updates need to be performed. Normalization is the process to broken data elements in to the several database table as per E.F.Codd rules, Codd defines three level of normalization form which are know as first, second, third normal forms.

- **Design of the Table Structure** After the normalization of the database tables we need to design the structure of each table. The structure design of each table involves defining of the data items in each table i.e. field name, length, data types (Alphabetic, Numeric, Date type, logical, Auto number etc) index, Primary Key, and various validation checks, etc.

- **Establishing the Relationships and enforcing Referential Integrity within the database tables** A relationship works by matching data in key columns — usually columns with the same name in both tables. In most cases, the relationship matches the primary key from one table which provides a unique identifier for each row, with an entry in the foreign key in the other table. The advantages gained by relational database are data redundancy, flexibility of data operation, simplicity power and ease of data management and maintenance. There are three types of relationships between tables; first one-to-one relationship, second one-to-many relationship and third many-to-many relationship. The
type of relationship that is created depends on how the related columns are defined. Referential integrity is a system of rules that ensure relationships between rows.

- **Design of the Queries** After the design of database and establishing the relationship, there is the need to develop queries. A query is non-procedural simple programming languages which helps the retrieval of data from different tables of the database according to the criteria. This reduces the program writing efforts. There are various types of queries available in the Database Management System (DBMS) software such as select, Union, Cross table, action, delete, append, update and sub queries.

**(iv). Organization of the Proposed Module in Logical Data Flow Diagrams (DFD)**
The model DFD is a powerful diagram that can be used to document the information flow. It presents to be broken down in top-down fashion. At the top level, data flows are represented at very abstract aggregate level. Each component of the data flow is further broken down to different levels, so that at each level we have just a few entities to concentrate on. DFD is a representation scheme used to represent The data storage (Storage and retrieval of data), processes (Where some changes are made to the system) and internal and external entities (the player in the game) and the actual information flows.

**(v). Control Design**
The control design indicates necessary procedure to ensure correctness of processing, preventing of duplication of data and various validation checks of data. This ensures the proper functioning of the system.

**5.2 DESIGN OF THE PROPOSED MODEL (UHRIS)**
The design of the proposed University Human Resource Information System (UHRIS) model is grouped under the following four modules, according to the core functions of the establishment sections of the university.

5.3 Establishment Module
5.4 Recruitment and Selection Module
5.5 Leave Accounting Module
5.6 Salary Processing Module
The UHRIS model is divided into 4 modules according to the functional nature of the work these modules are 1. Establishment 2. Recruitment and Selection 3. Leave Accounting 4. Salary Processing. Further each module is divided into various sub modules like Master, Transaction, Process, and Report. Further, each sub module is divided into different processes. These modules interact with the user by way of on-line data entry, editing, processing and generation of reports at pre-determined parameters. The master sub module provides the data entry screen for coding of reference data or transaction data. The transaction sub module provides the data entry screens to input the various personnel transactions data. The process sub module processes various functions like salary and DA Arrears process, recruitment process etc. The report sub module provides the report generation facilities on the basis parameters selection.

The detailed design aspects of each of the above modules are as follows.

5.3 ESTABLISHMENT MODULE

5.3.1 Scope and function of the Establishment Module

The system will help to carry out the following functions of the Establishment section of the University.

- Manpower Planning
- Skill inventory
- Faculty Research and Development activity
- Performance Evaluations
- Employee personnel details
- Confirmation
- Issue of Various Administrative Orders
- Miscellaneous functions

5.3.2 Organization of Establishment Module

The areas identified for developing the Establishment module are grouped in the following three functional sub modules.

- Establishment Master (EM)
- Employee Transaction (ET)
- Establishment Reports (ER)

Organizations of the establishment module are presented in the context DFD 4.1. The DFD incorporates above three functional sub modules.
Establishment Master (EM)

The functional sub module Establishment master consists of the following database tables. Each record of tables have unique ID number. The detailed design of table structure is given in APPENDIX - III. The Entity Relationship Diagram of Establishment Module is given in APPENDIX – II.

- Manpower Inventory Code: This table will be used to store data of all sanctioned post in various departments of the university, each sanctioned post consist of various funds like UGC, Government, General, Self Finance, NSS, and Project post.
- Faculty Code: This table will be used to store the names of faculties in the university.
- Department Code: This table will be used to store departments name

![Context Data Flow Diagram for Establishment Module](image)

- Section Code: This table will be used to store all the administrative sections of university.
- Job code (Designation): This table will be used to store various designations in the university.
- Pay scale Code: This table will be used to store the different pay scales that exists in various jobs.
- Professional Specialization Code: This table will be used to store the area of specialization of the faculty's member.
- Subject Specialization Code: This table will be used to store all the subject specialization.
- Awarded Code (Qualification): This table will be used to store qualifications code such as 01- BA, 02- B Sc, 03-B Com etc. for reference of the transaction tables.
- Subject Code (Subject Group): This table will be used to store subject groups.

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Diagram 4.2 gives the data flow and process design in EM module. It takes input from various source documents and updates EM module tables. The process assigns unique record ID (Code) of each table. Each of these tables serves as reference source table for the entire UHRIS model.

**Establishment Transaction (ET)**

The ET module stores all the personnel transactions data pertaining to the individual employee. The tables used for keeping the various record are given below. The detailed design of table structure is given in APPENDIX - III.

1. **Employee Master**: This table will be used to keep record of employee's personnel information such as name, address, date of birth etc. Every employee is assigned a unique employee ID.
2. **Qualification**: This table will be used to keep record of employee's qualification.
3. **Experience**: This table will be used to keep record of employee's who have previously worked in other institution.
4. **Professional Specialization**: This table will be used to keep record of faculty member specialization.
5. **Language**: This table will be used to keep record of employee's language skill.
6. **Nomination**: This table will be used to keep record of employee's PF, Pension, and Life Insurance nomination details.

Diagram No. 4.2 Data Flow Diagram for Establishment Master Sub Module

Updated Database Tables

- Faculty Code Master Table
- Department Code Master Table
- Section Code Master Table
- Job code Master Table
- Pay scale Code Master Table
- Manpower Inventory Code Master Table
- Professional Specialization Code Master Table
- Subject Specialization Code Master Table
- Awarded (Qualification) Code Master Table
- Subject Code Master Table
- Employee Transaction: This table will be used to keep record of employees joining, Promotion, Transfer, Confirmation history.
- NOC: This table will be used to keep record of the No Objection Certificate issue history of an employee.
- Disciplinary Action: This table will be used to keep record of disciplinary action taken against employees.
- Lien: This table will be used to keep record of employees who have availed Lien facility.
- Performance Evaluations: This table will be used to keep record of employees yearly performance evaluations.
- Outgoing (Separation): Employee separation from university service will be recorded in this table.

Diagram 4.3 shows the data flow and process design of ET module. This module provides facility for 10 data input forms (Screen) for recording of various personnel transactions of employee including the creation of employee master data. Each form provides facilities to add, edit, save, find, navigate record, and delete record.

The ET module provides various data entry form for easy and efficient input operations relating to various personnel transaction data. The Design of Input Screen format is shown on window 6.4 to 6.35 in Chapter 6. Some of the control operation measurer for operation is given below.

- At the time of employee master data input, the data entry screen process assigns the unique Employee ID for each employee. The Entire transactions represented are dealt through this Employee ID.
- In the input transaction, when the user input the Employee ID the input form automatically displays the concern employees name, department and designation etc.
- At the time of input of transaction like promotion, transfer, confirmation, NOC data, the input form automatically generates the unique transaction order no
- Before updating the record the input process checks the validity of the data
- Some of the input form display updated record into the grid below of the input form
The details of each of the process of ET module are as follows

Process 1 (2.1): This process deals with updating the employee master data for a new appointee. It receives the input of employee personnel information, language ability, position in the organization, and address from application form (which is submitted at the time of selection) and
joining report. Further, the process assigns unique employee ID number and update employee master, language, employee transaction tables.

Process 2 (2.2): It involves the input of the employee personnel details relating to qualifications, past experiences, research and development activity history and nomination data. It receives again the data from application form and nomination form and update qualification, past experience, language, specialization, Academic activity and nomination tables.

Process 3 (2.3): It deals with the confirmation transaction data input. The process accepts input only of those employee records who are eligible for confirmation. It receives the source data from the approved list of confirmation. The process output comes out in the form of updating confirmation date of the concern employee in to transaction table record.

Process 4 (2.4): It is concerned with the transfer of class III and class IV employees within the various teaching departments and administrative block. It receives input from approved transfer list. The process output updates the employee transaction table under ttype field = "2".

Process 5 (2.5): It deals with matters of promotion and selection grade. The process accepts only those employees transactions who are permanent and confirmed in the present post. Further, the process updates the employee transaction table and ttype filed = "3".

Process 6 (2.6): It is concerned with issue of no objection certificate (NOC). The process take input from approved note sheet and update NOC table.

Process 7 (2.7): It is concerned with Lien. The process accepts only those employees record who have been confirmed in the university service. The process takes input from approved lien note sheet and updates the Lien table. Whenever employees rejoin after the expiry of lien, the date of rejoicing is also updated.

Process 8 (2.8): It deals with the disciplinary action. It takes input from department files. The process output updates the Disciplinary Action table.
Process 9 (2.9): It deals with the performance evaluation. It takes input from department file where annual confidential reports (ACR) of individual employees are available. The process output stores the record on the Performance Evaluations table.

Process 10 (2.10): It deals with the Separation from university service. It takes input from approved separation note sheet where employees exit from university service in the form of retirement or prematurelyd retirement. The process outputs stores data relating to employee ID, mode of separation, and date of exit, address etc.

Establishment Report (ER)
The ER module Generate the various reports under the following major headings.

a) Manpower Planning
b) Skill inventory
c) Faculty Research and Development activity
d) Performance Evaluation
e) Employee personnel details
f) Confirmation
g) Issue of various administrative orders
h) Miscellaneous areas

Diagram 4.4 depicts the context DFD and process integration used in generation of the various establishment module reports. The basis of data retrieval by synthesizing the data table in EM module and ET module is done through queries and on selection of parameters. The Queries retrieve data from database table and parameters filter this retrieved data. Diagram no. 4.5 to 4.12 depicts the DFD and process design of ER Module. The Design of report (Output) format for Establishment module is given in Output Table 6.1 to 630 in Chapter 6.
a). Manpower Planning

Dig. 4.5 gives the DFD and process design of manpower planning reports in the following 6 processes. The details of each of the process generating reports are described below.
**Process 1 (3.3.1):** The process deals with the generation of the current status of the manpower inventory. It receives data from the employee transaction and master inventory tables through query 1 and query 2. The process also accepts parameter in the form of Department/Designation wise. The process output comes out in the form of current status of manpower inventory report.

**Process 2 (3.3.2):** The process deals with the forecast of the outflow through retirement during specific period. It receives data from the employee master table through query 3 which calculates future retirement on the basis of date of birth, superannuation, and parameters value. The process output generates the list of employees likely to during a given time range.

**Process 3 (3.3.3):** It deals with future rotation. It receives data from Performance Evaluation table through query 4. The process output generates the list of employees rotated due to transfer, promotion, and training during a given time range.

**Process 4 (3.3.4):** It deals with produce the list of employees separated from university service during given time range. It receives data from Outgoing table through query 5. The output of the process produces a list of employees separated from university service through various modes like retirement or pre-mature retirement as the case of parameter value.

**Process 5 (3.3.5):** The process 5 deals with employees on Lien. It receives data from lien table through query 6. The output produces the list of employees who are on lien.

**Process 6 (3.3.6):** It deals with employees against whom Disciplinary Action Pending. It receives data from Disciplinary Action table through query 7. The output of the process produces the list of employees against whom action is under process.

**b) Skill Inventory**

Diagram no. 4.6 gives the DFD and process design to project the search results of the skills available in the database. The process involves the following 6 steps.

**Process 1 (3.2.1):** This process deals with qualification search. It receives data from Qualification table through query 1. The process output searches skilled manpower available in the database in terms of qualifications.
Process 2 (3.2.2): It deals with searching of specific experience acquired by the employees in the university service. It receives data from EmployeeTransaction table through query 2. The process output produces the search result according to the input parameters.

Process 3 (3.2.3): This process relates to searching of specific experience acquired by the employees who have previously worked in other institution. It receives data from Past Experience table through query 3. The process output displays the search result according to the input parameters.

Diagram no. 4.6 Data Flow Diagram for Generating Skill Enventory Reports

Process 4 (3.2.4): The process relates to faculty specialization. It receives data from Specialization table through query4. The process output generates the faculty members with their respective specialization.
Process 5 (3.2.5): This process deals with search of language skill of the employees. It receives data from Language table through query 5. The process output produces the search result according to the input parameters.

Process 6 (3.2.6): This process deals with searching of computer literate employees. It receives data from Qualification table through query 6. The process output produces the list of employees who are computer literate.

c) Faculty Research and Development Status
Diagram no. 4.7 gives the DFD and process design of Faculty Research and Development (R&D) status under the following major R&D areas.

Diagram no. 4.7 Data Flow Diagram for Generating Faculty R&D Status Reports

Process 1 (3.3.1): It is concerned with faculty R&D ledger. It receives data from Academic Activity table through query 1. The process output generates the R&D ledger of faculty under the respective R&D activities as specified in the selection of parameters.

Process 2 (3.3.2): It is concerned with statistical information about R&D activity areas attempted by the faculty members, teaching departments and whole university in a specific period range. It receives data from Academic Activity table and Academic Details table through query 2. Whereas academic details tables hold the various title heading of different R&D activity areas. The process output generates the R&D statistics of individual faculty members/departments/university.
d) Performance Evaluation

Diagram no. 4.8 gives the DFD and process design of Performance Evaluation of the employees.

The report is grouped under the following 4 processes.

Diagram no. 4.8 Data Flow Diagram for Generating Performance Evaluation Reports

Process 1 (3.4.1): It deals with Annual Confidential Report (ACR). It receives data from the Performance Evaluation table through query 1. The process output produces the list of employees whose ACR have been received by the establishment section for a specific session.

Process 2 (3.4.2): It is concerned with non-receipt of employees CR. It takes input from Performance Evaluation table through query 2. The process output generates the list of department/Administrative section where ACR are awaited in a particular session.

Process 3 (3.4.3): It deals with recommendation of superior. It receives data from Performance Evaluation table through query 3. The output of this process gives the report of recommendation for promotion, transfer, confirmation etc. as per the parameter.

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Process 4 (3.4.4): It is concerned with the Overall Performance. It receives data from Performance Evaluation table through query 4. The output of this process is generating the overall performance rating given by the superior according to the input parameter supply.

e) Employee personnel details
Diagram no. 4.9 gives the DFD and process design of employee's personnel details under the following 3 process.

Diagram no. 4.9 Data Flow Diagram for Generating Employee Personnel Details Reports

Process 1 (3.5.1): It concerned with the Service Book Preparation. It receives data from Employee Master table, Employee Transaction table, Employee Ledger details, Increment History tables through query 1 and query 2. Query 1 retrieve record of various personnel transactions like promotion, transfer, confirmation, disciplinary action etc. Whereas query 2 retrieves record from Employee Ledger details table which hold the service book transaction title heading data. The process output generates the service book (Part II) of the employees in a given time range.

Process 2 (3.5.2): It deals with employees Bio-Data. It receives data from qualification and Experience table through query 3 and query 4. Query 3 is Union query it retrieve data from qualification and experience table whereas query 4 retrieve records from employee ledger details table which hold the various title heading data of this report. The output of this process is
generating the employees Bio-Data (first part of the service book information). The report may be viewed with Employee ID/Department/Designation.

Process 3 (3.5.3): It is concerned with the Nomination. It receives data from nomination table through query 5. The process output generates the nomination form of the employees for the purpose of pension, issuance, and provident fund.

f) Confirmation
Diagram no. 4.10 presents the DFD and process design of confirmation reports under the following 4 process.

Diagram no. 4.10 Data Flow Diagram for Generating Confirmation Reports

<table>
<thead>
<tr>
<th>Process</th>
<th>Generated Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.6.1</td>
<td>List of Employee Confirm in University Service</td>
</tr>
<tr>
<td>ConfirmationAC3</td>
<td></td>
</tr>
<tr>
<td>3.6.2</td>
<td>List of Employee Eligible for Confirmation in University Service</td>
</tr>
<tr>
<td>ConfirmationAC1</td>
<td></td>
</tr>
<tr>
<td>3.6.3</td>
<td>List of Employee Confirmed in present post</td>
</tr>
<tr>
<td>ConfirmationAC4</td>
<td></td>
</tr>
<tr>
<td>3.6.4</td>
<td>List of Employee Eligible for Confirmation in Present Post</td>
</tr>
<tr>
<td>ConfirmationAC2</td>
<td></td>
</tr>
</tbody>
</table>

Process 1 (3.6.1): It is concerned with confirmation in the university service. It receives data from employee transaction table through query 1. Query retrieve only those record where confirmation date is not null. The process output produces the list of employees who are confirmed in university service.

Process 2 (3.6.2): It is concerned with employee eligible for confirmation in the university service. It receives data from employee transaction table through query 2 this query retrieve only those record where employees appointed on substantive/permanent basis and complete two years of the
service. The process output generates the list of employee eligible for confirmation in the university service.

**Process 3 (3.6.3):** The process deals with employee confirmed in the present post i.e. employee who are previously confirmed in the university service and appointed/promoted in higher post. It receive data from Employee Transaction table through query 3, this query retrieve only those record where confirmation date of present post is not null. The process output is generated list of employee who are confirmed in present post.

**Process 4 (3.6.4):** It is concerned with eligible for confirmation in the present post. It takes data again from Employee Transaction table through query 4, this query retrieve only those record where holding post is substantive/permanent in nature and employee complete 2 year of service in holding post. The process output generates the list of employee eligible for confirmation in their present post.

g) **Issue of Administrative Orders**

Diagram no. 4.11 presents the DFD and process design of administrative order issue. It involves the following 7 process.

**Process 1 (3.7.1):** It is concerned with confirmation order. It receives data from Employee Transaction table through query 1. The process output generates the confirmation orders on selection of specific confirmation order number range.

**Process 2 (3.7.2):** It is concerned with promotion order. It receives data from Employee Transaction table through query 2. The process output generates the promotion orders on selection of specific promotion order number range.

**Process 3 (3.7.3):** It is concerned with transfer order. It receives data from Employee Transaction table through query 3. The process output generates the transfer orders on selection of specific transfer order number range.
Process 4 (3.7.4): It is concerned with lien order. It receives data from Lien table through query 4. The process output generates the lien orders on selection of specific lien order number range.

Process 5 (3.7.5): It is concerned with issue of No Objection Certificate (NOC). It receives data from NOC table through query 5. The process output generates the NOC orders on selection of specific NOC order number range.

Process 6 (3.7.6): It is concerned with Notification of Selection Grade. It receives data from Employee Transaction table through query 6. The process output generates the Notification of Selection Grade orders according to the parameter order number.

Process 7 (3.7.7): It is concerned with Retirement Notification. It receives data from Employee Master table through query 7, the query calculates the retirement date on the basis of date of birth of the employee's and superannuation rules. The process output generates the retirement notification order to employees who are retiring in a given date range.
I). Miscellaneous Reports

Diagram no. 4.12 presents the DFD and process design of miscellaneous reports. It involves the following 12 processes.

**Diagram no. 4.12 Data Flow Diagram for Generating Miscellaneous Reports**

**Process**

- **3.8.1** MiscellaneousAC1 Year
- **3.8.2** MiscellaneousAC2 Year
- **3.8.3** MiscellaneousAC3 Year
- **3.8.4** SeniorityAC1 Not Applicable
- **3.8.5** Separation from University Service
- **3.8.6** Separation from University Service Not Applicable
- **3.8.7** Report for Promotion, Transfer
- **3.8.8** List of PF Deduction Start Date
- **3.8.9** Department Information
- **3.8.10** Employee Mailing Label
- **3.8.11** List of Head of the Department
- **3.8.12** Employee ID List

**Input Parameters**

- Employee Completed certain year of Service
- Search Employee Stagnation for Transfer
- Search Employee Stagnation for Promotion
- Seniority List
- Appointment on Various Ground
- Between Date From... To... View Department/Designation/Employee ID Wise
- Between Date From... To... Make of Appointment/Compensation/Depend etc
- Between Date From... To... Statistics for Recruitment/Promotion/Transfer
- Enter Faculty Name, Types of Employee: Teaching/Non-Teaching
- Employee Mailing Label
- List of Head of the Department
- Employee ID List

**Generated Output**

- Employee Completed certain year of Service
- Search Employee Stagnation for Transfer
- Search Employee Stagnation for Promotion
- Seniority List
- Appointment on Various Ground
- Between Date From... To... View Department/Designation/Employee ID Wise
- Between Date From... To... Make of Appointment/Compensation/Depend etc
- Between Date From... To... Statistics for Recruitment/Promotion/Transfer
- Enter Faculty Name, Types of Employee: Teaching/Non-Teaching
- Employee Mailing Label
- List of Head of the Department
- Employee ID List

**Process 1 (3.8.1):** It is concerned with employee completed certain year of service. It receives data from Employee Transaction table through query 1. The process output gives the list of employee's completing service of certain year.

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Process 2 (3.8.2): It is concerned with stagnation of transfer. It receives data from Employee Transaction table through query 2. The process output produces the list of employee who have not transferred for a long time.

Process 3 (3.8.3): It is concerned with stagnation of promotion. It receives data from Employee Transaction table through query 3. The process output produces the list of employee not promoted for the long time according to the input parameter i.e. years.

Process 4 (3.8.4): It is concerned with seniority list of employees. It receives data again from Employee Transaction table through query 4. The process output generates the seniority list of the various job categories.

Process 5 (3.8.5): It is concerned with the employee separation from the university service. It receives data from outgoing table through query 5. The process output generates the list of employees separated from service during a specific period through various modes.

Process 6 (3.8.6): It is concerned with the employees appointment on various ground. It receives data from Employee Master and Employee Transaction table through query 6. The process output generate the list of employees appointed on various ground during a specific period under various categories of employees like Sc, St, OBC, Women, Physical Handicraft etc.

Process 7 (3.8.7): It is concerned with government compliances and report. It receives data from Employee Transaction table and Employee Master Table through query 7. The process output generate statistical data about list recruitment, promotion, retirement of employees in a specific period range under the various categories like Sc, St, OBC, Women, Physical Handicraft etc.

Process 8 (3.8.8): It deals with starting date of provident fund deduction. It receives data from Employee Master Table through query 8. The process output produces the list of employees along with pf deduction starting date.
Process 9 (3.8.9): It is concerned with department information. It receives data from Employee Transaction and Department tables through query 9. The process outputs generate the list of employees working under various departments.

Process 10 (3.8.10): It involves with employees mailing labels. It receives data from Employee Master table through query 10. The process output generates address labels of the employees.

Process 11 (3.8.11): It is concerned with HOD (Head of the Department) list. It receives data from Employee Transaction, Faculty and Department table through query 11. The process output generates the Head of the Department list with their telephone number.

Process 12 (3.8.12): It is concerned with Employee ID number. It receives data from Employee Transaction table through query 12. The process output generates the Employee ID number list.

5.4 RECRUITMENT AND SELECTION MODULE

5.4.1 Scope and Functions of the Recruitment and Selection Module
The system will help the following functions of the Establishment section.
- Candidate Personnel Details
- Selection Process
- Selection Order Issue

5.4.2 Organisation of Recruitment and Selection Sub Modules
The areas identified to design the recruitment and selection module is grouped under the following four sub module.
- Recruitment and Selection Master (RSM)
- Recruitment and Selection Transaction (RST)
- Selection Process (SP)
- Recruitment and Selection Reports (RSR)

Each of the above functional sub modules is further divided into various processes. These modules interact with the user by way of on-line data entry, editing, processing and generation of various reports at pre defined parameters. Organisations of these modules are depicted in diagram no.
4.13 to 4.20 under subsequent process. Diagram no. 4.13 gives the control module incorporating the DFD and process design of the modules. It consists of the above mentioned four sub modules.

**Diagram no. 4.13 Context Data Flow Diagram for Recruitment Module**

**Input Source Document**

1. **Recruitment and Selection Master**
   - Input No. of Post
   - Advertisement, Closing Date, Candidate Application forms
   - Screening Marks
   - Interview Marks Obtained by Candidate
   - Cut of Marks for various categories candidate

2. **Recruitment and Selection Transaction**
   - Input Adv. No. Post, Department

3. **Selection Process**

4. **Recruitment and Selection Reports**

**Updated Tables**

1. Advertisement Master
   - Vacancy Master
   - Candidate Master Tables

2. Screening Marks
   - Interview Marks Tables

3. ETSEM Modules Tables
   - Department
   - Jobcode
   - Payscale
   - Sub-Spl-Code
   - Sub-Code-Group

**Recruitment and Selection Master (RSM)**

The recruitment master consists of the following database tables. The detailed design of following table structure is given in APPENDIX - III. The Entity Relationship Diagram of Recruitment and Selection Module is given in APPENDIX - II.

- **Recruitment Advertisement Master**: This table will be used to store advertisement notification details.
- **Recruitment Vacancy Master**: This table will be used to store vacancies of the advertisement notification.
- **Recruitment Candidate Bank Master**: This table will be used to store various nationalized bank name for the sorting of recruitment fees (Demand Draft) according to the bank.
- **Recruitment Candidate Master**: This table will be used to store candidate personnel information such as name, address, position applied, etc.
- **Recruitment Candidate Academic**: This table will be used to store candidate Research and Development data
- **Recruitment Candidate Qualification**: This table will be used to store candidate qualifications
- Recruitment Candidate Experience: This table will be used to store candidate experiences

Diagram no. 4.14 gives the data flow and process design of this sub module. Each of the process provides the input data entry forms. The Design of Input Screen format is shown on window 6.64 to 6.75 in Chapter 6. The process take input from various source documents. The process also takes various references from Establishment module (ET and EM sub module) tables such as Department, Job code, Pay scale, Subject Code, Subject group, Subject Specialization etc. After inputting the data the process update various tables. The details of each of this process are as follows.

**Diagram no. 4.14 Data Flow Diagram for Recruitment Master (RM) Sub Module**

**Input Source Document**

**Process**

- **1.1** frmAdvertisement Master
- **1.2** frmRect.Vacance Master
- **1.3** frmCandidate Master
- **1.4** frmCandidateQualification frmCandidatePastExperience frmAcademicActivity

**Updated Tables**

- **1** Advertisement Master Table
- **2** Vacance Master Table
- **3** Candidate Master Table
- **4** Candidate Qualification Experience R&D Activity Tables

**Process 1 (1.1):** This process deals with advertisement master for the starting of recruitment process. It receives the input data such as advertisement number, date, closing date etc. from advertisement notification source documents. The process output records data into the advertisement master table.

**Process 2 (1.2):** This process deals with Vacancy Master. It receive data again from advertisement notification and accept input data such teaching/administration (where post is vacant), Designation, no. of post vacant under the various categories. The process output records data into the vacancy master table.
Process 3 (1.3): It deals with Candidate Master. It receives data from candidate application form and accepts input data such as name, address, fee details, and NET examination details (for lectureship post). The process takes reference from process 1 for recording of data in to advertisements master. The process generates the unique application no.; this generated application number is used for entire transaction of applicant. The process output records data into the candidate master table.

Process 4 (1.4): It is related to Candidate Personnel Details. It receives again data from candidate application form and accepts input data such as candidate qualification, experience, and R&D data (for teaching post). The process output records the data in to the candidate Qualifications, Experience, Research activity tables.

Recruitment and Selection Transaction (RST)

The Recruitment and Selection Transaction module consists of the following database tables. The detailed design of following table structure is given in APPENDIX - III.

- Recruitment Candidate Screening: This table will be used to store candidate screening weightage marking by the screening committee
- Recruitment Candidate Interview: This table will be used to store candidate interview weightage marking by the selection committee

Diagram no. 4.15 gives the data flow and process design of this sub module. This sub module provides facility for two data entry forms for input of screening and interview marks weightage marking by the screening and selection committee respectively. This module take various reference from RM sub module such as application number, candidate name, post he applied and department where the post is vacant. This module consists of following process.

Process 1 (2.1): It is concerned with candidate screening weight age. It receive data from screening mark weightage (on the basis of qualification, experience and desirable qualification etc.) decided by the screening committee. The process also updates the remark field where
application form is rejecting due to various reasons. The process output updates the weightage and total marks of the Recruitment Candidate Screening table.

Diagram no. 4.15 Data Flow Diagram for Recruitment Transaction (RT) Sub Module

Process

Input Source Document

2.1
frmCandidate Screening

Updated Tables

1
Recruitment Candidate Screening Table

2
Recruitment Candidate Interview Table

Process 2 (2.2): It deals with interview weightage mark. It receive data from interview score mark weightage. The process output updates Recruitment Candidate Interview table with marks of weightage that candidate has obtained.

Selection Process (SP)

Diagram no. 4.16 presents the data flow and process design of this sub module. These modules involve the 3 process steps.

- How many candidates call for interview?
- Selection of the candidate under various categories as per the advertisement.
- Preparations of waiting list.

Diagram no. 4.16 Data Flow Diagram for Selection Process Sub Module (SP)

Input Source Document

Process (frmCandidateProcessing)

Updated Tables

1
Recruitment Candidate Screening Marks Table

2
Recruitment Candidate Interview Marks Table

127
Process 1 (3.1): It deals with application form screening. It receives data from Recruitment Candidate Screening table. The process output update the result field with screened/not screened of Recruitment Candidate Screening table according to the parameter such as Advertisement Number, designation, department, date of interview Cut-Off Marks for screening of various categories candidates such as SC, ST, OBC, General etc.

Process 2 (3.2): It deals with selection process. It receives data from Recruitment Candidate Interview table. The process output update the result field with “Selected” of Recruitment Candidate Interview table according to the parameter such as Advertisement Number, designation, department, Cut-Off Marks for selection of various categories candidate such as SC, ST, OBC, General etc.

Process 3 (3.3): It deals with waiting list. It receives data from Recruitment Candidate Interview table. The process output update the result field with “Waiting” of Recruitment Candidate Interview table according to the input parameter such as Advertisement Number, designation, department, Cut-Off Marks for waiting list of various categories candidate such as SC, ST, OBC, General etc.

Recruitment and Selection Reports (RSR)

Diagram no. 4.17 depicts the context DFD and process integration in generating the various recruitment and selection module reports. On the basis of data retrieval by synthesizing the data table in ET&EM module of Establishment, Recruitment and selection module tables through various queries and process. The process accepts various parameter, parameter filter the retrieving data. Diagram no. 4.17 to 4.20 depicts the DFD and process design of this sub module. The RSR module consists of following 3 sub modules namely. The some of the Design of report (Output) format under Recruitment and Selection module is given in Output Table 6.39 in Chapter 6.

a) Candidate Personnel Details
b) Recruitment and Selection process
c) Selection order Issue
a). Candidate Personnel details report

Diagram no. 4.18 gives the DFD and process design of this report. The report divided under 4 processes.

Process 1 (4.1.1): It is concerned with comparative bio-data. It receives data from Recruitment Candidate Qualification and Experience table through query1. The process output generates comparative bio-data for specific post selection process.
Process 2 (4.1.2): It is concerned with candidate Research and Development details (for the teaching post). It receives data from Recruitment Candidate Academic table through query2. The process output generates the R&D activities history of the applicant.

Process 3 (4.1.3): It is concerned with remittance fees. It receives data from Recruitment Candidate Table through query3. The process output is generating the bank wise list for withdrawal of this recruitment fees (Demand Draft) from various bank through query3.

b) Recruitment and Selection Process Report
Diagram no. 4.19 shows the DFD and process design of this report. It consists of following 7 process steps.

Process 1 (4.2.1): It is concerned with list of rejected application form. It receives data from screening table through query1, this query retrieve only those record where result field is rejected. The process output generates the list of rejected application form.

Process 2 (4.2.2): It is concerned with screening of marking list. It receives data from screening table through query2. The process output gives the list of candidate with marks scored by them in screening.

Process 3 (4.2.3): It is concerned with interview marks weightage. It receives data from interview table through query 3. The process output produces the list of interview marks scored by candidates.

Process 4 (4.2.4): It is concerned with interview call letter. It receives data from screening table through query 4. The process output generates call letter for interview.
Process 5 (4.2.5): It is concerned with selected candidate list. It receives data from interview table through query 5. The process output generates the list of selected candidate.

Process 6 (4.2.6): It is concerned with waiting list. It receives data from interview table through query 6. The process output generates the waiting list.

Process 7 (4.2.7): It is concerned with state government compliances. It receives data from Candidate Master and Interview table through query 7 (Cross table query). The process output generates recruitment and selection statistical data, with break-up with various categories of candidates such as SC, ST, OBC, P.H., Ex. Service Man etc.
c). Selection Order Issue

Diagram no. 4.20 gives the DFD and process design of order issue report. It involves following 3 process steps.

Process 1 (4.3.1): It relates to address label of candidate. It receives data from Candidate Master Table and Department table through query1. The process output generates the address labels of the applicants.

Process 2 (4.3.2): It is concerned with interview call letter. It receives data from screening table through query2. The process output generates the interview call letter for eligible candidates.

Process 3 (4.3.3): It is concerned with appointment letter. It receives data from Recruitment Candidate Interview table through query2. The process output generates the appointment letter for selected candidates.

5.5 LEAVE ACCOUNTING MODULE

5.5.1 Scope and functions of the Leave Accounting Module

The system generates the following reports of Leave accounting functions of the Leave Cell functioning under the Establishment section of the University.

- Entitlement of EI and HPL credit in periodical time.
- Leave Ledger.
- Leave Balance.
- Leave Order (Leave sanctioned, Cancellation order, and Note sheet for approval of leave).

5.5.2 Organization of Leave Accounting Sub Modules

The areas identified for developing the Leave accounting module is grouped in the following three functional sub modules.
Leave Master (LM)
Leave Transaction (LT)
Leave Reports (LR)

Each of these above functional modules is further divided into various processes. These modules interact with the user by way of on-line data entry, editing, process and generation of reports at predetermined parameters. Organizations of the above module are depicted pictorially in diagram No. 4.21 to 4.24 under subsequently process. Diagram 4.21 gives the context DFD incorporating the data flow and process design of this module. It consists of the above three sub modules.

Diagram no. 4.21 Context Data Flow Diagram for Leave Accounting Module
UHRIS Database Tables

Queries

Process

Updated Tables

Leave Master (LM)
The Leave master consists of leave reference table. It record the various leave with unique leave identification number (ID). The detailed design of following table structure is given in APPENDIX - III. The Entity Relationship Diagram of Salary Processing Module is given in APPENDIX – II.

Leave Transaction (LT)
The Leave transaction consists of the following database tables.

- Leave Master: This table will be used to store CF leave balance from manual leave accounting at the time of implementation of this new system.
- Leave Transaction: This table will be used to store all the leave transaction either credit of leave or debit of leave.

Diagram 4.22 gives the data flow and process design in LT module. This Process provides the 7 data entry screen integrated in single data entry form with 7 tabs. The Design of Input Screen
format is shown on window 6.80 to 6.89 in Chapter 6. This entry screen facility to add, edit, save, find, navigate record, and delete records. It takes input from various source document and updating LT modules tables. Before updating of the table the process checks the validity of input data whether the data is according to the leave rules which have been discussed in the chapter 4. This sub module automatically generates leave transaction order number and Order Date for each leave transaction. It also calculates the total days of leave based on the leave from and leave to date. Current balances of leaves are updated automatically. The details of each of the process of LT module are as follows:

**Process 1 (1.1):** This process deals with leave CF balance from manual system. It receives input data relating to present leave balance of EL and HPL and other leave availed by the employees in his/her service life from manual leave accounting ledger. The process output updates the Leave Master table.

**Process 2 (1.2):** It involves the leave credit transaction (leave deposit periodically) of EL, HPL and Detained (for teaching post). It receives input data from entitlement of EL and HPL on periodical basis. The Process accepts input for EL credit at 31st December and 30th June of every year and for HPL credit on completion of every one year service. The process output updates leave credit data into the leave transaction table.

**Process 3 (1.3):** It deals with Debit Leave (Leave taken). It receives data from leave application form of employees in different department/section. The process accepts input of various data item such as leave type, date from... To, Purpose of leave, Prefix from, Suffix from etc. Before updating of transaction data into the table process check the following validity.

- Is the employee's eligible for this leave?
- Is the proper balance in his leave account?
- Is the number of days leave taken by employees according to the leave rules?

The process output updates the leave transaction table under the transaction field, as "Dr." and updates the respective leave field with the total leave grant (store negative values of no. of days leave) according to the leave rules.
Process 4 (1.4): It deals with the leave encashment i.e. surrender of EL. The process receives data from leave encashment application form from the employees. The process accepts input data such as number of days leave surrender. The process output comes out in the form of updated transaction field of Leave Transaction table with "ENCASHMENT", and the update process also the respective leave field with total days of leave surrender (store negative values of no. of days leave surrender) according to the leave rules.

Process 5 (1.5): It is concerned with Other Leave (SDL, MAIT, and STUDY) grant. It receives input data from leave application form. The process accepts various input data field such as leave type,
generator process design under 7 steps. Some of the Design of report (Output) format under Leave Accounting module is given in Output Table 6.43 in Chapter 6.

Diagram no. 4.23 Context Data Flow Diagram for Leave Accounting Report (LAR) Sub Module UHRIS Database

Diagram no. 4.24 Data Flow Diagram for Leave Accounting Report (LAR) Sub Module

Process 1 (2.1): It is concerned with periodical deposit of EL and HPL entitlement. The process receive various related data field from Employee master and Employee transaction table of establishment module through query 1 this query calculate the entitlement of EL and HPL as per the leave credit rules. The process output generates the EL/HPL entitlement report.

Process 2 (2.2): It is concerned with checklist for leave transaction input data. The process receives data from leave module tables through query 2. The process output generates the various checklists according to the user need for verification of input data.
date from... To etc. The process outputs updates the transaction field of Leave Transaction table as "OTHER LEAVE" and updates the respective leave field with total days of other leave grant (store negative values of no. of days leave) according to the leave rules.

**Process 6 (1.6):** It deals with Adjustment of Strike period leave. It receives data from authority decision. The process output is update the transaction field of Leave Transaction table with "STRIKE_ADJ" and update the respective leave field, which is debited from his leave account (store negative values of no. of days leave adjusted due to participation of strike)

**Process 7 (1.7):** It is concerned with Extra Ordinary Leave Adjustment (EOL). This process is generally done on yearly basis. It receives input data from LR module under daily transaction report, which is given the list of EOL avail by employees in previous year. The process output updates the transaction field of Leave Transaction Table as "EOL-ADJ" and debits the 1/10 EL in respect of 1 day EOL.

**Process 8 (1.8):** It is concerned with Cancellation of Leave which is previously sanctioned. It receives data from concerned employees or Head of the department. The process output updates the transaction field of Leave Transaction Table as "CANCELLED" and stores the deposit leave in respective leave field.

**Leave Reports (LR)**
The LR module Generate the various reports under the following major heading.
- Employees Entitle for EI and HPL in periodical period.
- Generate the Checklist for leave transaction input data.
- Generate the Leave Ledger.
- List of latest Leave Balance.
- Issue of Leave sanctioned/cancellation Order and generate Note sheet for approval of leave.

Diagram number 4.23 depicts context DFD and process integration in generation of the various Leave module reports on the basis of data retrieval by synthesizing the data table in EM/ET module tables and Leave accounting module tables through various queries and process. The process accepts parameters which filter the retrieving data. Diagram no. 4.24 depicts the DFD and report
generator process design under 7 steps. Some of the Design of report (Output) format under Leave Accounting module is given in Output Table 6.43 in Chapter 6.

Diagram no. 4.23 Context Data Flow Diagram for Leave Accounting Report (LAR) Sub Module UHRIS Database

Diagram no. 4.24 Data Flow Diagram for Leave Accounting Report (LAR) Sub Module

Process 1 (2.1): It is concerned with periodical deposit of EL and HPL entitlement. The process receive various related data field from Employee master and Employee transaction table of establishment module through query 1 this query calculate the entitlement of EL and HPL as per the leave credit rules. The process output generates the EL/HPL entitlement report.

Process 2 (2.2): It is concerned with checklist for leave transaction input data. The process receives data from leave module tables through query 2. The process output generates the various checklists according to the user need for verification of input data.
Process 3 (2.3): It is concerned with generation of Leave ledger. The process receives data from leave module tables through query 3 and query 4. The process output generates the leave ledger.

Process 4 (2.4): It is concerned with Leave balance. It receives data from Leave module tables through query 5. The process output generates the up-to-date leave balance of employees.

Process 5 (2.5): It is concerned with issue of leaver orders. It receives data from leave module tables through query 6. The process output generates the Leave sanctioned/cancellation. Note sheet for leave approval.

Process 6 (2.6): It is concerned with search of defaulters of re-joining duty report after availing the leave. It receives data through query 7. The process output generates the above list.

5.6 SALARY PROCESSING MODULE

5.6.1 Scope and functions of the Salary Processing Module

The system will help the following functions of the Salary Cell functioning under the Finance section of the University.

- Payment statements (Salary Register, Pay slip, Salary Consolidate)
- Ledgers generation (Personnel Loan, Family benefit life insurance, University Contribution Provident Fund)
- Payment transfer to bank List (For Salary, DA Arrears, Supplementary Bill Payments)
- Remittances schedule
- Income tax related report

5.6.2 Organization of Salary Processing Sub Modules

The areas identified for developing the Salary module is grouped in to the following four functional sub modules.

- Salary Master (SM)
- Salary Transaction (ST)
- Salary Process (SP)
- Salary Report (SR)
Each of these functional modules is further divided into various processes. These modules interact with the user by way of on-line data entry, editing, process and generation of reports at predetermined parameters. Organizations of the above module are also depicted pictorially in diagram No. 4.25 to 4.34 which is further explained under subsequent process. Diagram 4.25 gives the context DFD incorporating the data flow and process design of this module. It consists of the above four sub modules. The sub module take references such as employee ID, Name, Department, Designation, Post type, Fund, Class (Teaching/Non-Teaching) data field from Employee Transaction and Employee Master Table from Establishment Module.

Diagram No. 4.25 Context Data Flow Diagram for Salary Moduel

Source Documents

- Salary Processing Rules (Define parameter of Payment and Deduction)
- Paydata On request deduction from Employees

Process

1. Salary Master
   - Input
   - Update table

2. Salary Transaction
   - Update table

Parameter

Salary Process Month (DD-MM-YYY)

Select Various Parameters for report Generation

3. Salary Process
   - Process Salary, supplementary bills and DA Arrears and Update table

4. Salary Report

Update Tables and Database

1. Salary Master Tables

2. Salary Transaction Tables

Salary Master (SM): This module consists of the following database tables. The detailed design of following table structure is given in APPENDIX - III. The Entity Relationship Diagram of Salary Processing Module is given in APPENDIX – II.

- Pay Master: This table will be used to store various rates of payment and deduction under salary head like DA, HRA, Medical, PF, GPF etc. in different basic pay range.
- Salary Master: This table will be used to store data related to employees Salary account number, PF account number, PAN, (for income tax) Basic Pay, Personnel Pay, Increment
Date, Salary Calculation ID, HRA Status, Allowance status and Professional Tax Status of the employees.

- Accommodations Master: This table will be used to store Quarter number and house rent for employee residence at campus.
- LIC Master: This table will be used to store employees LIC premium details such as Policy number, Premium installment etc for on request deduction of LIC premium amount from salary (under salary saving scheme).
- Loan Master: This table will be used to store loan and advance details of employees.
- Increment History: This table will be used to store annual increment historical data of employees at the time of conversion to the new system.

Diagram 4.26 gives the data flow and process design in SM module. This Process provides the 6 data entry screen; The Design of Input Screen format is shown on window 6.97 to 6.110 in Chapter 6. Process takes input from various source documents relating to salary transaction and update the salary master sub module tables. This process is one time input, whenever changes occur the process allows the editing of this master data. The details of each of the input processes are as follows:

**Process 1 (1.1):** It is concerned with Pay Master. This input process accept input data relating to rate of payment and deduction under various salary head like DA, HRA, Various allowances, GPF, EPF, Professional tax etc. under four basic pay slab range; each slab is calculated on the basis of basic pay percentage and having minimum and maximum limit based on the present rate of payment, It also accept the adding/editing facilities where new payment and deduction item is apply or rate are change by government orders. The process output updates the paymaster table.

**Process 2 (1.2):** It is concerned with Salary Master. It receives data from present automated salary system and assign payment and deduction status of employees. The process accept input data such as Salary account number, PF account number, PAN, (for income tax) Basic Pay, Personnel Pay, Increment Date, Salary Calculation ID, HRA Status, Allowance status and Professional Tax Status, and opening balance of Employee contribution of provident fund, FBLIC of the employees. The process output updates the salary Master Table.
The following coding has been assigned to above process. Payment Calculation ID (Identification)

<table>
<thead>
<tr>
<th>Employees Categories</th>
<th>Eligible for Payment/Deduction</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Regular empl. opted Pension</td>
<td>All Payment/Deduction</td>
<td>C</td>
</tr>
<tr>
<td>2. Regular employees opted CPF</td>
<td>All Payment/Deduction</td>
<td>U</td>
</tr>
<tr>
<td>3. Temporary employees</td>
<td>Not deducted ECPF/UCPF</td>
<td>E</td>
</tr>
<tr>
<td>4. Temp. empl. Opted ¾ P.F. Deduction</td>
<td>Not deducted ECPF/UCPF</td>
<td>T</td>
</tr>
<tr>
<td>5. Contingence employees</td>
<td>Fix Salary</td>
<td>M</td>
</tr>
<tr>
<td>6. Term appointment employees</td>
<td>All except Interim Relief.</td>
<td>I</td>
</tr>
<tr>
<td>7. Deputation from State Govt.</td>
<td>All Payment with GPF/GIS</td>
<td>G</td>
</tr>
<tr>
<td>8. Re-employment</td>
<td>Fix Salary</td>
<td>R</td>
</tr>
<tr>
<td>9. Suspended employees</td>
<td>80 % Payments of total salary</td>
<td>S</td>
</tr>
<tr>
<td>10. Employees on Lien</td>
<td>Nil</td>
<td>L</td>
</tr>
</tbody>
</table>
Washing Allowance Status

<table>
<thead>
<tr>
<th>Status</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not Applicable</td>
<td>0</td>
</tr>
<tr>
<td>Applicable</td>
<td>1</td>
</tr>
</tbody>
</table>

House Rent Status:

<table>
<thead>
<tr>
<th>House Rent Status</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not Applicable</td>
<td>0</td>
</tr>
<tr>
<td>Eligible</td>
<td>1</td>
</tr>
<tr>
<td>Provide Residential Accommodation</td>
<td>2</td>
</tr>
</tbody>
</table>

Special Allowance Status:

<table>
<thead>
<tr>
<th>Allowance Status</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>% of Basic Pay</td>
<td>In %</td>
</tr>
<tr>
<td>Fixed Amount</td>
<td>In Rs</td>
</tr>
</tbody>
</table>

Professional Tax Status:

<table>
<thead>
<tr>
<th>Prof. Tax Status</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not Applicable</td>
<td>0</td>
</tr>
<tr>
<td>I Range</td>
<td>150</td>
</tr>
<tr>
<td>II Range</td>
<td>200</td>
</tr>
<tr>
<td>III Range</td>
<td>250</td>
</tr>
<tr>
<td>IV Range</td>
<td>300</td>
</tr>
<tr>
<td>V Range</td>
<td>350</td>
</tr>
<tr>
<td>VI Range</td>
<td>400</td>
</tr>
</tbody>
</table>

**Process 3 (1.3):** It is concerned of Accommodation Master. The process records quarter number, house rent, and other related deduction rate in the case of employees who have residence in the campus. It receives data from engineering section. The process output record House Rent deduction in Accommodation Master table.

**Process 4 (1.4):** It is concerned with LIC Master. It receives data like Policy number, Premium amount, maturity date etc. in the form of employees on request deduction from salary. The process output updates the LIC Master table.

**Process 5 (1.5):** It is concerned with Loan Master. It receives data whenever employee take the various loans the process accepts the various input data like loan type, loan sanctioned date, amount of loan, total installment, first installment and last installment (in case of different the installment amount). The process assign various loan types in the following manner. The process output generates the unique loan ID number for each loan transaction and record data in loan master table. The following types of loans are undertaken by the salary processing system.
<table>
<thead>
<tr>
<th>Types of Loan</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>PF loan-a</td>
<td>11</td>
</tr>
<tr>
<td>PF loan-b</td>
<td>12</td>
</tr>
<tr>
<td>PF loan-c</td>
<td>13</td>
</tr>
<tr>
<td>PF loan-d</td>
<td>14</td>
</tr>
<tr>
<td>3/4 Deposit loan</td>
<td>15</td>
</tr>
<tr>
<td>House &amp; Building loan</td>
<td>16</td>
</tr>
<tr>
<td>Harizan society bank loan</td>
<td>17</td>
</tr>
<tr>
<td>Society loan</td>
<td>18</td>
</tr>
<tr>
<td>State bank loan-a</td>
<td>19</td>
</tr>
<tr>
<td>State bank loan-b</td>
<td>20</td>
</tr>
<tr>
<td>City bank loan</td>
<td>21</td>
</tr>
<tr>
<td>X loan (Blank)</td>
<td>22</td>
</tr>
<tr>
<td>Y loan (Blank)</td>
<td>23</td>
</tr>
<tr>
<td>Z loan (Blank)</td>
<td>24</td>
</tr>
<tr>
<td>Grain advance recovery</td>
<td>25</td>
</tr>
<tr>
<td>Festival advance recovery</td>
<td>26</td>
</tr>
<tr>
<td>Examination Advance recovery</td>
<td>27</td>
</tr>
<tr>
<td>General administration Advance recovery</td>
<td>28</td>
</tr>
<tr>
<td>Department advance recovery</td>
<td>29</td>
</tr>
<tr>
<td>Cycle advance recovery</td>
<td>30</td>
</tr>
</tbody>
</table>

**Process 6 (1.6):** It is concerned with input data of increment history. It receives input data such as Increment Date, Basic pay, Increment Amount etc. from manual service book. The process output updates the increment history table.

**Salary Transaction (ST)**

Diagram no. 4.27 gives the data flow and process design of ST module. This module provide the 3 data entry screen for monthly salary transaction data, yearly increment of employees, other income (for income tax purpose). The process consists of following three process.

**Process 1 (2.1):** It is concerned with monthly salary transaction. It receives data from pay data and employees on request deduction under Provident Fund, Income Tax item. The process output stored in salary transaction table.

**Process 2 (2.2):** It is concerned with annual increment. The Process accepts input parameter "Month of Salary process"; based on the month. Process retrieves record from salary master table where employees increment is due. The process collects the pay scale from Employee
Diagram No. 4.27 Data Flow Diagram for Salary Transaction Sub Module

Transaction table of Establishment module, after that it checks the next stage of basic pay in increment master table and generates the list of employees where increment is due on present month. List consists of new basic pay, increment amount, etc. Whenever these changes occur, the process updates new basic pay into the salary master table (where basic has been stored) then it transfers it to the increment history table for future reference.

**Process 3 (2.3):** It is concerned with storing of other income. It receives data from source documents. This input is especially useful for the generation of form16 report for comply of income tax department. The process output updates other income table.

**Salary Process (SP)**

Diagram no. 4.28 depicts the salary process. It consists of 3 processes Salary, Supplementary Bill payment, and DA arrears. It receives data from Employee Transaction and Employee Master and Salary module tables through various queries. It consists of following process.

**Process 1 (3.2.1):** It deals with processing of monthly salary. The steps for processing of the monthly salary are as follows.

- First of all the process accepts input parameter "Enter month of salary process". Based on the input for the month, the process calculates the total working days of employees. formula for
• calculation of total working days is - [(Parameter Month (Days)) – Pay Data Table (No. of days absent)].

After that the process receives basic pay from salary master table and update entitlement of basic pay (on the basis of total working days) into the salary table. The details operations of salary process involve the following steps.

a) For the calculation of DA, CCA, Medical Allowance, IR, HRA, Conveyance allowance and other allowances as well as deduction like PF, GPF, Professional Tax, FBLIC, Income Tax etc. the process receives various data from salary master table and basic pay (stored in salary table); on the basis of this source data and the various rate of payment and deduction are made available to the paymaster table (Various basic pay ranges). The process output updates the calculated salary data.

b) For the deduction of house rent, LIC premium and on request deduction of employees, the process receives the data from Accommodation Master, LIC Master, Salary transaction tables and updates the deduction in to salary table in respective fields. The process checks the LIC premium data with respect to the maturity status.
c) For the recovery of loan and advances, the process receives data from Loan Master table and updates the deduction in the related loan field along with installment number. The process deducts installment until the recovery of the loan amount. The process also updates the installment number in the loan master table.

d) Updating of total deduction is based on the sum total of all deductions. For the calculation of gross pay, the process subtracts the total deduction from the total pay field.

The process calculates and the output appears in the salary table. The process output is finally transferred into the Salary history Table with updates the SStatus field with "Salary".

**Process 2 (3.2.2):** It is concerned with preparation of supplementary payment bill under semi automatic manner. It receives data from salary history table on the basis of input parameter value i.e. employee Id, Month, after that the process accepts the data and updates “Suppl. Bill” in to the SStatus field of salary. The process output finally transfers salary into the salary history table for generating salary register.

**Process 3 (3.2.3):** It is concerned with calculation of DA Arrears. The process accepts following input parameter –

1. DA Arrears (Period) Fm... To... and
2. Percentage (%) of DA.

It receives data field employee ID and Basic Pay from Salary Master Table through Query1. Query2 retrieve increment date and increment amount from increment history table where increment transaction record between above date. The process calculates the total month of DA arrears given on the basis of date difference between input parameter dates FM...TO.. and increment date. After the total month is calculated, the total DA Arrears amount is calculated on the basis of Basic Pay multiply by DA Rate percentage (%) multiply by Month. The process also allows deduction of income tax etc. from Arrears. The process updates SStatus field with "DA Arrears" in salary table. Finally the DA Arrears data is transferred into the salary history table for printing of arrears register.
Salary Reports (SR)

Diagram no. 4.29 depicts the context DFD. The process integrates the various salary processing reports on the basis of data retrieved by synthesizing the data table in ET and EM module of Establishment module and Salary Modules tables through various queries and process. The parameters value filters the data. Diagram no. 4.29 to 4.33 depicts the DFD and report generation process. The design of this module is explained in detail manner under subsequent report process. Some of the Design of report (Output) format for Salary Processing module is given in Output Table 6.44 to 6.53 in Chapter 6.

The SR module report is grouped under the following headings.

a) Payment Statement
b) Ledger Preparation
c) Payment Transfer to Bank
d) Remittance schedule
e) Income Tax related reports (Form 16 and Salary Certificate)

Payment Statement Reports

Diagram no. 4.30 gives the DFD and process design of this report. The report generates is grouped under the following 4 reports process.

Process 1 (4.1.1): It is concerned with generation of Salary Register. It receives data from Salary history table where field SStatus equal to “Salary” through query1. The process output generates the Salary Register in a given month.
Process 2 (4.1.2): It is concerned with generation of Pay Slip. It receives data from Salary history table where field SSStatus equal to “Salary” through query2. The process output is generating the Pay Slip for a given month.

Diagram No. 4.30 Data Flow Diagram for Payment Statement Report

- **Queries**
  - QryCurrentPosition
  - 1 QrySalaryRegister
  - 2 QryPayslip
  - 3 QrySalaryConsolidate
  - 4 QrySalaryHRDeduction

- **Process**
  - 4.1.1. RegisterAC1
  - 4.1.2. PayslipAC1
  - 4.1.3. ConsolidateAC1
  - 4.1.4. HRDeductionAC1

- **Input Parameters**
  - Date FM...TO...

- **Generated Output**
  - Salary Register
  - PaySlip
  - Consolidate
  - House Rent Deduction List

Process 3 (4.1.3): It is concerned with Salary Consolidate. It receives data from Salary history table where field SSStatus equal to “Salary” through query3. The process output generates the Salary Consolidate Statement. The Salary consolidate statement accepts the following parameters.

1. Post Type : Teaching/Non-Teaching
2. Fund: UGC/General/Government/NSS/Project/Self Finance, etc.

Process 4 (4.1.4): It is concerned with generation of House Rent Deduction. It receives data from Salary history table where field SSStatus equal to “Salary” through query4. The process output generates the house rent deduction list.

b) Ledger Preparation
Diagram no. 4.31 gives the DFD and process design of this report. The details of each of the ledger generation processes are grouped under the following steps.
Process 1 (4.3.1): It is concerned with FBLIC ledger generation. It receives data from Salary history table and Salary Master Table (balance of C.F. from manual system) through query1. The process output generates the FBLIC Ledger of employees.

Diagram No. 4.31 Data Flow Diagram for Ledger Generation

Process 2 (4.3.2): It is concerned with UCPF ledger generation. It receives data from Salary history table and Salary Master Table (balance of UCPF C.F. from manual system) through query2. The process output is generates the UCPF Ledger of employees.

Process 3 (4.3.3): It is concerned with Loan ledger generation. It receives data from Salary history table and Loan Master Table through query3 and query4. The process output generates the Loan/Advance recovery Ledger.

Payment Transfer to Bank Reports

Diagram no. 4.32 gives the DFD and process design of this report. The report generated under this heading is grouped under the following 3 process steps.

Process 1 (4.2.1): It is concerned with salary transfer to Bank. It receives data from Salary history table where field SStatus equal to "Salary" through query1 and query2. The process output generates the Salary transfer list.
Process 2 (4.2.2): It is concerned with DA Arrears transfer to Bank. It receives data from Salary history table where field SStatus equal to “DA Arrears” through query3. The process output generates the DA Arrears transfer list.

Process 3 (4.2.3): It is concerned with Supplementary Bill Payment transfer to Bank. It receives data from Salary history table where field SStatus equal to “Supp. Bill” through query4. The process output generates the Supplementary Payment transfer list.

Remittance Schedule
Diagram no. 4.33 gives the DFD and process design of this report. The details of each of this report generator process are grouped under the following steps.

Process 1 (4.4.1): It is concerned with Income Tax. It receives data from Salary history table through query1. The process output generates the Income Tax remittance list.

Process 2 (4.4.2): It is concerned with Professional Tax. It receives data from Salary history table through query2. The process output generates the Professional Tax remittance list.

Process 3 (4.4.3): It is concerned with LIC Premium. It receives data from Salary history table through query3. The process output generates the LIC premiums remittance list.

Process 4 (4.4.4): It is concerned with SBI Loan. It receives data from Salary history table through query4. The process output generates the SBI Loan recovery remittance.
Diagram No. 4.33 Data Flow Diagram for Remittances Reports

Process 5 (4.4.5): It is concerned with City Bank Loan. It receives data from Salary history table through query5. The process output generates the City Bank Loan recovery remittance.

Process 6 (4.4.6): It is concerned with Harian Society Bank Loan. It receives data from Salary history table through query6. The process output generates the Harian Society Bank Loan recovery remittance.

Process 7 (4.4.7): It is concerned with Society Loan. It receives data from Salary history table through query7. The process output generates the Society Loan Recovery remittance.
Income Tax related Reports

Diagram no. 4.34 gives the DFD and process design of this report. The details of each of this report generator process are grouped under the following steps.

**Diagram No. 4.34 Data Flow Diagram for Income Tax Related Report**

**UHRIS Database**

**Process 1 (4.5.1):** It is concerned with generation of FORM 16. It receives data from Salary history, Salary Master, Other Income tables through Qryform161, Qryform162, and Qryform163. Qryform161 retrieve the total Gross Salary, TDS (Tax Deduction at Source), Professional Tax, Donation, EPF, GPF, FBLIC, LIC, TFD in a specific financial years as input into parameter. Based on the data retrieved by the Qry161, the Qry162 calculates the Standard Deduction, Total Taxable Income, and calculate the income tax on the following incomes ranges i.e. (1). 60,000 to 1,50,000 (2). 1, 50,001 to 3,00,000 (3). Above 3,00,000 and Total Rebate. Whereas Qry163 uses the above retrieval data field and calculates the Surcharges, Total Tax, Balance Tax, and Tax Payable. The process output generates the Form 16 for the purpose of filing. The income tax return form by the employees. The process calculates income tax data on the basis of financial year 2002-2003 Income Tax rules.

**Process 2 (4.5.2):** It is concerned with preparation of Annual Salary Certificate. It receives data from Salary history, and Salary master tables through Salary Annual Increment Certificate query. The process output generates the Annual Salary Certificate for given time range.
5.7 DEVELOPMENT OF PROPOSED MODEL (UHRIS)

The design phase is the foundation on which the development phase is built upon. In this phase software development work is categorized into two sub phase i.e. Database design and Program design. Database design is related to the data organisation that depends on the requirements specification, available features of the programming language and the Data Base Management System (DBMS) used. The Program design is mainly concerned with program writing (Coding), editing of programme, and debugging of the programme followed by testing.

The present application software development on the Windows Operating system required three tools. These tools are Front-end, Back-end, and Third-party. Front-end tool is the application software developer's package and it provides the kit to develop the input data entry screen (forms), updating of data through process and report generation facilities with interactive user dialog, menu, icon, graphics, color and various object. Back-end tool is related to Database Management System (DBMS) software. The function of back-end tool is to define, create, revise, and control data in the database. It provides facility for creating, updating, retrieving of data, and building application software. The third-party tool is neither a part of front-end tool nor a part of back-end tool. It is a product of some other software firm which provides the various interface tools for the software development. In the windows operating system having Graphics User Interface (GUI) environment a range front-end tools consisting of MS-Access, Visual Basic, Visual FoxPro, etc are available. Whereas in the back-end tools DBMS Softwares consisting of Oracle, MS-Access, Sybase, ingress etc are available.

5.8 SELECTION OF SOFTWARE

The considerations made in selection of window operating system with Visual Basic(Ver. 6) as front end tool, Microsoft Access 2002 as back end tool and Data Dynamic as third party tool for their application in developing the proposed model of UHRIS are as follow.

Windows Operating System

The Window operating system is multi-threaded and preemptive multi-tasking operating system which means that more than one application can be made to run simultaneously and more smoothly. The Window provides graphical operating environment. The entire program and other
resources can be provided in the form of icons. It organizes all work on the desktop or in folders. The Windows is effective in cleaning up after crash of faulty application. It contains a disk compression program which can essentially double the storage space.

**Visual Basic**

The VB is one of the quickest and easiest way to create application under Windows operating system platform. The VB application software allows to develop attractive and useful applications that fully exploits the graphical user interface. The VB is more productive as it provides appropriate tools for the different aspects of the GUI development. One can create the graphical user interface for the current application by drawing a graphical way. We set the properties on these objects to refine appearance and behavior and then we make this interface react to the users by writing code that responds to the events that occur in the interface. Using VB we can create powerful full-featured applications that exploit the key features of windows including multiple documents interface (MDI), object linking and embedding (OLE), dynamic data exchange (DDE) etc. The VB can be extended by adding custom controls and by calling procedures in Dynamic Link Libraries (DLLs). Besides the above features, The Visual Basic as front-end tool was also necessitated due to the following considerations.

- Event Driven programming
- Object oriented programming
- Providing many interfaces such as multimedia, Database Management and System programme
- Support third party tools

**Microsoft Access (Ver. 2002)**

The MS-Access 2002 has been used for storing of data. It provides the facility to the relational database on back-end tool. It is one of the most powerful Relational Database Management System (RDBMS) under Windows operating system platform. Some of the important features of the software include.

- Ease to create and maintain database
- Relationship and referential integrity is easily enforced
• Designing of the various queries viz. select, insert, update, delete, join, union, cross-table are very easy.

• Data can be served and extracted based on certain conditions and parameters value through queries, thus data access is faster.

• The database engine easily to create the connection between VB and MS-Access

• It Provides security through password/user level

Data Dynamic

The Data Dynamic as a third party tool has been used for generation of reports. Even though the data report tool of VB has various limitations, The Data Dynamic tool provide the latest technology with full integration, open architecture, and user-friendly interface. The tool has several advanced features. We can preview multiple pages reports simultaneously, utilize the new text search feature to search through a report for a specified text string, and report pages can now be copied to the clipboard and pasted in another document. The viewer control also has enhanced through Intel Mouse support, a splitter control, and the ability to add custom icons. This tool allows field controls, image controls and OLE object controls to be bound to fields in a data source control. When a report is run it reads each record from the data source and loads the bound field value into the control it also allows up to 32 nested groups in a single report. It can also be applied to multiple reports that require grouping based on a calculated expression. This type of grouping has been achieved with this tool by setting some of the properties.

5.9 DATABASE CREATION

As per the database structure designed at design phase, The database is created by using MS-Access software. The various activities undertaken during the database creation stage include data structure, primary key, foreign key, index, relationship to be established among the table fields, reference integrity to be enforced, creation of queries according to the need and criteria as specified in the design phase. The tables structure, relationship, queries developed and recorded in a CD (Compact Disk) and may be referred under database folder with name “UTD.MDB” (APPENDIX – IV).
5.10 SOFTWARE DEVELOPMENT

The processes relating to data entry screen, report generation, calculations etc. as specified in the design phase are developed by writing programs in the computer language. The programming is done in the following steps.

1) The DFD created at design phase has guided step by step procedure for each module and their sub module of the proposed model. It also obtained the input, output and processing requirement of each module. The detailed functions of the system as well as requirement of the model.

2) On the basis of above functional understanding and requirements the various program logic and algorithms are developed along with flowchart, decision tables, etc. The algorithms serve as the logical road maps to writing the programme code. The algorithm was tested with different test data.

3) On the basis of above algorithms, the computer programs are written using VB. The program included the procedure, routine and subroutine for the various processes of the each sub modules. The program functions are arranged in logical manner.

4) After writing the program it is compiled and tested through test data for generating desired output. The test data is prepared as per the requirement specification of the program. The test data is fed into the computer and output are compared with the required report. The bugs of a program are removed by programming techniques and debugging. During debugging, the program code and algorithm are reviewed and corrected. Finally the various user friendly menus are developed.

The details programme codes (Listing) for different modules are recorded in CD and may be referred under “UHRIS with source code” folder. (APPENDIX – IV).