ARMY MEDICAL COLLEGE
AUTOMATION SYSTEM

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Abstract

Army Medical College is an academic institution, primarily looking after the needs of armed forces medical requirement. However it also contribute in educating and training private/ foreign students. College runs two disciplines MBBS and BDS concurrently. For smooth functioning of college affairs it has been divided into three wings, administration, academic and library. Administration wing looks after most of the administrative affairs of the college. A cadet after being selected by NUST reports to the Army Medical College. The Wing is responsible for allocating “cadets numbers” to all the cadets. Broadly the wing looks after they’re living affairs and ensures provision of

stores required during their course of study. Academic wing keeps track of students performance throughout his/her stay in the college, the responsibility of this wing includes cadets registration with NUST, conduct of exams, assigning instructors to courses, compiling/ issuing of result and in the end preparing and maintaining the seniority roll especially for the Medical Cadets. Library Wing is responsible to provide reference/ course material required for the courses. It will maintain record of all the library items, which will be issued / received. The whole process is manual working causing a lot of problems for the staff.

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INTRODUCTION

1.1 Introduction

Army Medical College (AMC), an academic institution, came into being in 1977 with an aim to train specially selected medical cadets for five academic years according to the syllabi laid down by the Pakistan Medical and Dental Council (PM & DC) for MBBS degree and thus create a cadre of high quality career doctors, primarily for the Army Medical Corps. Later on it was also to plan BDS courses of four years duration. Soon after creation of Army Medical College it was affiliated with Quaid-i-Azam University. The college was recognized by PM & DC and GMC-UK in 1982, the same year, saw the passing out of its first batch. In 1998 the college affiliation was finally made with National University Of Science And Technology (NUST). Same year Bachelors in Dental Sciences (BDS) courses were started. The college initially was capable of training a hundred students annually, which know has risen to approximately one hundred and seventy in the disciplines of MBBS, and BDS. College has a unique honor of training medical cadets from friendly countries as well.

1.2 Problems

Since AMC works in an academic setup, the main key factor is the time in this regard. If the results are managed timely/appropriately, lot of time and effort are saved by the organization.

The encountered problems are highlighted as under: -

a. Using spreadsheets for maintaining activities.

b. Lack of organized data on the past years performance.

c. The compilation of data takes time to find out the result of any particular course/ individual in a particular semester/ year

d. The detection of errors is difficult as the existing system involves extensive documentation.

e. The calculation work is more prone to the human errors.

f. The result sheets of the departments do not reach the headquarters, in time.

g. There is no filtration possible and there are no insertion checks.

h. System is somewhat insecure.

i. Besides the hectic data entry operations spreadsheets don't provide ad hoc search capabilities to satisfy most important need of Army Medical College.

1.3 Possible Options

In order to handle the existing problems, there are two possible solutions available: -

1.3.1 Manual Work

It is the existing system in which all the departments' plan/ prepare the classes/ results towards the end of the semester and forwarding it to the headquarters. The preparation of reports and returns is also time consuming.

1.3.2 Database Management System

This is the suggested solution in which all the authorized individuals from each department while sitting at their own locations from the desktop computer can view/ process there respective results, and forwards it to the headquarters, where the system/network can manipulate and update the data according to the laid down procedures. The system has the facility to maintain the old records in a proper manner, which will also serve as basis for future planning. It will keep all previous record of each semester/ term (including written as well as viva).

Reports generation, for each department, will be easy as the prescribed format can generate reports in a very short duration.

1.4 The Project

"Creation of an automated system for the Army Medical College" it is the process of keeping track of the administration and academic events and smooth functioning of the library affairs. It will facilitate to receive a new cadet, will capture his previous academic / social activities and would continuously monitor his current ones as well. Further it will facilitate in to how the library items are to be demanded, received and further issued to the cadets/ faculty members. The database is arranged in such a manner that the storage and retrieval of required data is simple and easy. So the project is concerned with the whole functionality of cadets of Army Medical College and is limited on to departments' premises with the capability to go on line in future.

1.5 Project Aims And Objectives

The main aims and objectives of the project are:-

a. Conversion of manual system with the computerized one.

b. Security of data.

c. Removal of the inefficiencies of the existing system.

d. Removing the redundancy of data in the existing system.

e. Making the system efficient and time dependent.

f. Simplify the inventory process.

g. User-friendly interface.

h. Training of the users, so that they can use the system easily and efficiently.

1.6 **Scope of Study**

The scope of this study lies with the Army Medical College, Rawalpindi. It deals with the process of keeping track of the administration and academic events and smooth functioning of the college's library affairs. The scope of this project is:

a. To provide quick information about cadets / faculty.

b. To provide information on the status of the students studying at the College.

c. To provide readily information about the faculty serving in the College.

d. To generate the computerized Prof-wise results, of students, based on their term results scored during the respective Profs.

e. To provide information about the courses being run at College.

f. To provide information about the subjects, departments, and the faculty at the College.

g. To update the library stock on issue.

h. To update the library stock on receipt.

j. To provide information about the library items issued / returned to the library.

i. To prepare the detailed computerized result sheet.

1.7 **Layout of Thesis**

a. Chapter 1 is the "INTRODUCTION" of the complete project in brief. It describes briefly the role of the Army Medical College and its functions. Further the problems, which were identified during the study of the

College, are highlighted. This leads to the possible options. This will help us to establish the project aims and objectives and finally it leads to the scope of study.

b. Chapter 2 is the “REQUIREMENT ANALYSIS”. It studies the organization of the College and its main components. This will lead us to detailed study of the College academic system with its problems. This is mainly the existing system, working in the College.

c. Chapter 3 is the “CONCEPTUAL MODEL AND DESIGN”. It describes the various models available. It also describes the relational database management system, which is the core feature of the design of the database. The selection of the software and hardware is also mentioned in this chapter. “ORACLE” features and its reason of selection are discussed here.

d. Chapter 4 is “IMPLEMENTATION AND RESULTS”. It describes the main screens, how they appeared and how they can be used. After data entry, it also showed the results. It also shows the reports, which are generated after the combination of different tables.

e. Chapter 5 is “OBJECTIVES, ACHIEVEMENTS AND FUTURE WORK”. It describes the objectives of the project, how much achievement has been obtained in this connection and the work suggested for the future.

1.8 **Summary**

Introduction describes whole project in a very brief manner. It points out the major stages on which the modules are designed, what are the objectives and what are the problem areas. It also describes the layout of the thesis chapter wise.

CHAPTER 2
REQUIREMENT ANALYSIS

2.1 Introduction

The main aim of requirement analysis is to understand the problem that the software system has to solve. The emphasis in this analysis laid on identifying what is needed from the system, and not how the system will achieve its goals. There are at least two parties involved in the software development i.e. the client and the developer. The developer has to develop the system to satisfy the client's needs.

Requirement Phase involves two major activities. One is detail study of the existing system and second is the problem analysis. In the problem analysis, the analyst has to understand the problem and its context. Such analysis requires a thorough understanding of the existing system, the parts which are to be automated. Once the problem is analyzed and the essentials are understood the requirement specification is in the form of a document.

2.2 Organization of College

The Army Medical College has been divided into primarily three Wings for efficient and smooth working of all concerned departments. The Vice Principal office looks after all the activities of the Wings.

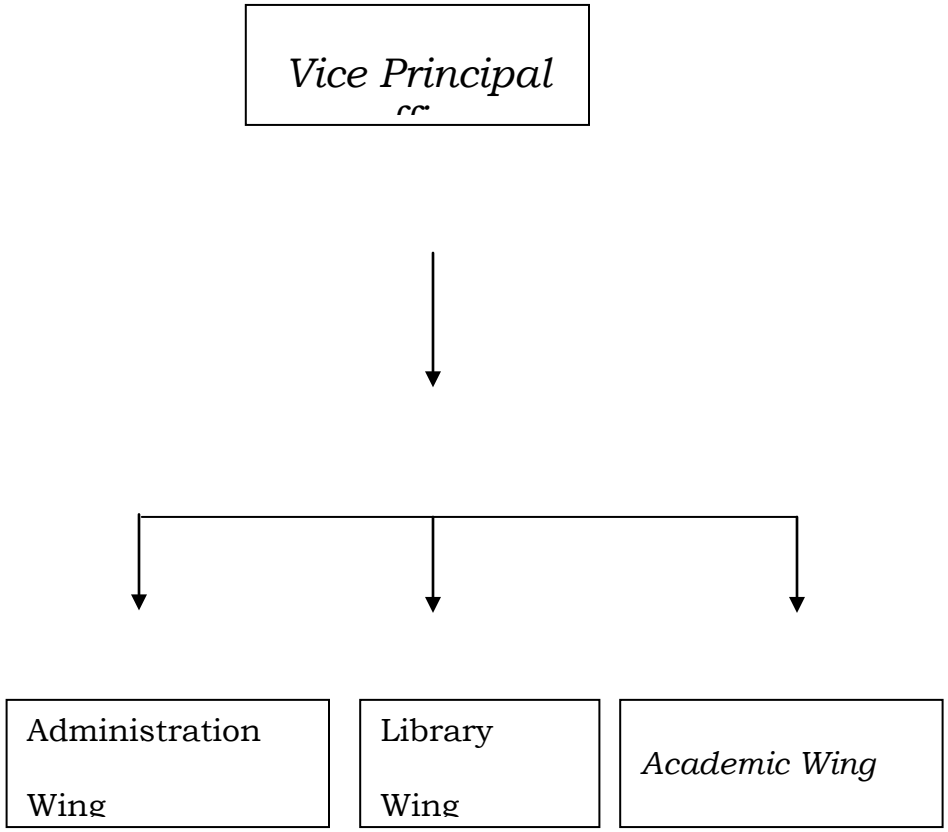


Fig No 2.1: Organizational Chart of Colle

2.2.1 Vice Principal's Office

This office supervises all the activities taking place in the College premises. He is responsible for the execution of orders issued from PM & DC, National University Of Science and Technology (NUST), Military Training Directorate (MT Dte) and from the Principals Office from time to time in true spirit and handles the administration of the College. He ensures the timely execution of events as per the program. He also ensures that forward planning of different events taking place in the college. Primarily this office maintains cohesiveness among working of the three main wings. Starting from the time a cadet is selected, he/she is allotted a company, living status is looked into, which is followed by starting of the respective course, different activities taking place in the course (academic/ social), finally dispatching of final result to PM & DC. This office also decides on the relegation / withdrawal cases and at finally termination of the course, for military cadets allotment of there seniority numbers, all these affairs are looked after by this office. Similarly the receipt of library items, their maintenance, issue/ receipt etc all matters among different wings are coordinated under the supervision of this office.

It also ensures timely submission of reports and returns to the NUST/ PM & DC/ MT (Dte). Vice Principal Office supervises the following sections:

a. Administrative Wing

b. Academic Wing

c. Library Wing

d. Cadet Affair Wing

2.2.2 Administration Wing

This wing looks after most of the administrative affairs of the college. A cadet after being selected reports to the Army Medical College. Here the student is enrolled in the specific course. The Wing is responsible for allocating “cadets numbers” to all the cadets. Broadly the wing looks after they’re living affairs and ensures provision of stores required during their course of study. This wing is further subdivided into following sub departments.

a. Training Branch

It ensures provision of training aids.

b. Account Branch

It looks into the accounts affairs of the cadets.

c. Q Branch

Provides all the quartermaster stores to the college.

d. Company Branch

Looks after the company affairs.

e. Military Transport Branch

It has a fleet of MT vehicles, which are required for transportation of cadets from college to Compound Military Hospital or Military Hospital for conduct of practical training.

f. Mess Branch

Looks after the Mess activities of the cadets, who are in living.

g. Medical Inspection Room

To run/ maintain the affairs of MI Room.

All the branches have an in-charge who in turn supervises the activities of the branch. The branch in-charge physically examines the stores /items receipt and maintains a ledger for accountability purpose.

2.2.3 Academic Wing

Army Medical College is primarily an academic institution. Cadets who apply for admission belong to four categories i.e. Medical Cadets, NUST Cadets, Paying Cadets and Foreign Cadets. Academic wing keeps track of students performance throughout his/her stay in the college, the responsibility of this wing includes cadets registration with NUST, conduct of exams, assigning instructors to courses, compiling/ issuing of result and in the end preparing and maintaining the seniority roll especially for the Medical Cadets. There are basically two courses run at Army Medical College MBBS and BDS. Breakdown of the course department wise is as under: -

a. MBBS

This course comprises of four professional exams, which are spread over duration of five years. Students have to appear in four professional exams and clear them with minimum of 50% marks (both in theory and practical). Departments affiliated with the course are as under: -

(1) Basic Sciences Department

This department is responsible for teaching subjects i.e. Anatomy & Histology, Physiology, Biochemistry and Islamic & Pakistan Studies in First Professional Part I & Part II.

(2) Medical Department

This department is responsible for teaching subjects i.e. Pharmacology & Therapeutics, Pathology general Microbiology & Parasitology, forensic medicine & Toxicology in Second Professional. Community Medicine, Ophthalmology in Third Professional, While Medicine including Psychiatry & Dermatology and Pediatrics' including Neonatology in Fourth Professional.

(3) Surgical Department

This department is responsible for teaching Otorhinolaryngology (ENT) in Third Professional. Whereas Surgery including Orthopedic & Anesthesia, Gynecology and obstetrics in Fourth Professional.

(4) Pathology Department

It involves teaching special Pathology in Third Professional.

b. BDS

Here students again take four professional exams, but the duration of the course is four years. In the first Professional both the courses almost study the same subject with minor variations. Departments affiliated with the course are as under: -

(1) Basic Sciences Department

This department is responsible for teaching subjects i.e. Anatomy & Histology, Physiology, Biochemistry, Science of Dental Material, Laboratory Techniques and Islamic & Pakistan Studies in First Professional. Whereas Oral Anatomy, Histology, Physiology & Tooth Morphology in the Second Professional.

(2) Medical Department

This department is responsible for teaching subjects i.e. Pathology general, Microbiology & Parasitology, General and Dental Pharmacology, & Therapeutics in the Second Professional. Medicine, Oral Pathology & Microbiology, Oral Diagnosis, Period ontology in the Third Professional, and Forensic Medicine & Toxicology in Fourth Professional.

(3) Surgical Department

This department is responsible for teaching Surgery in Third Professional. Whereas prosthetics including Crown & Bridgework, Orthodontics & Radiology, Operative/ Restorative/ Corrective, Dentistry including Endodotics Pedodontics, & Community Dentistry, Oral and Maxillary Surgery, Anesthesia, Medico Dental Ethic & Dental Practice in Fourth Professional.

(4) Pathology Department

It involves teaching Oral Pathology in Third Professional.

c. Result Calculation System

Now come over to the core issue that is conduct, recording and compilation of exams which are overall held under the auspicious of National University Of Science And Technology,

but primary responsibility lies with the college and to be more precise each Department is responsible for taking exams and making the internal evaluation of appeared students in respective courses. Academic Wing is responsible for following: -

(1) Earmarking of Examiners

(2) Issue of Date Sheet

(3) Holding of exams on due dates

(4) Compiling results of each subject

(5) Making of the merit list (especially for the Medical Cadets)

(6) Etc

Now as far as above-mentioned points are concerned, only sub-Para (4) needs to be further elaborated. **What do we mean by compiling results?** This means completing the practical exams marks, as all theory marks are with PM & DC. Practical marks are distributed into two parts. Professional final practical which has a weight age of 85 percentage and 15 percentage marks are calculated using formula known as internal evaluation. This internal evaluation is made transparent as under: -

(a) In each Professional / Part, three exams are held, known as first term, second term and send ups (this exam include the theory as well as practical part). The students are graded as per their output in the exams.

(b) Once the practical part of Professional final exam is held, the marks obtained during, above-mentioned three tests will be added and average of it will form as 15 percent marks. PM & DC does the final result compilation.

2.2.4 Library Wing

Library Wing is responsible to provide reference/ course material required for the courses. The material can be in the form of books, journals, magazines, audios, videos, transparences etc. The Wing will maintain a record of all the above-mentioned items, which will be issued / received. Moreover it will generate monthly / quarterly reports regarding state of material held, missing, wholly or partially destroyed, and material which need to be right off. Library material is available for the faculty members (permanent or temporary), cadets and library members mostly of army medical corps. Rules for the issue of material vary from member to member as under:-

a. Faculty Member

These include all permanent / visiting faculty members. They can get the material issued for fourteen days. The faculty is permitted to get the reference material issued and can use audios, videos and transparences as training aids, of library.

b. Cadets

Cadets are issued two sorts of material. One the course material, which is issued for the duration of that particular professional and second the material which is not part of course material, which is issued for a duration of seven days. Cadets are not issued any reference material; they can only have it during the library hours.

c. Other Members

These are the library members who are stationed in Rawalpindi Cantonment, mostly Officers of Army Medical Corps. They can get the books issued for fourteen days. As cadets they are not entitled to get the reference material issued.

2.2.5 Cadet Affair Wing

Responsibility of cadets affairs wing is to keep an up to date record of discipline, performance, merits, demerits, personal record, previous academic performance, hospital record, leave record allotment of company. It is headed by the Battalion Commander, who has under his command an adjutant and 5 * company's.

2.3 Technical Terms

There are some technical terms, which will be used in the document during analysis. These are:

a. **MBBS**

b. **BDS**

c. **Prof** It is the academic year, which for MBBS (less the first prof) / BDS course is of one calendar year duration. First Prof of MBBS comprises of two parts each of one calendar year duration.

d. **AMC** Army Medical College.

e. **NUST** National University Of Science And Technology, with whom AMC is affiliated.

f. **MC** Medical Cadets who will be later on serve in the armed forces. They will be commissioned as captains in the army at the termination of the course.

g. **NC** NUST Cadets are private students who appear / qualify after appearing in the exam held by NUST.

h. **PC** Paying Cadets are private students who appear / qualify after appearing in the exam held by NUST. They only differ from NC as they are son / daughter of ex armed forces personal.

i. **FC** Foreign Cadets of neighborly friendly countries who come to study.

2.4 PROBLEM ANALYSIS

Problem analysis is conducted to obtain a clear understanding of the needs of the clients and users, and what actually is desired from the software. So, the major part of this phase is to study the existing system.

2.4.1 Existing System

The current system is working manually. A cadet after being selected reports to the Army Medical College. Here the student is enrolled in the specific course and the course begins. Although each wing has a stand-alone personal computer, but is being used as only as a typewriter. Now once a report is to be generated or result being compiled, lot of time is lost because of synchronizing format of the reports, which is a laborious job.

2.4.1.1 Feasibility Study

The objective of the initial study is to take an overview of the existing system and decide whether the project is feasible for organization i.e. it meets all the requirements of the organization with lesser cost than existing system and more efficient and reliable. The feasibility will be of three types: -

a. Financial feasibility
b. Technical feasibility
c. Operational feasibility

2.4.1.2 Financial Feasibility

It means to investigate whether the benefits of the new computerized system are much greater than the existing manual system and the development cost of the new project will be less than the benefits gained through new project. The hardware used is although not available in the College at present but with the induction of this, the efficiency of the work will be increased many times.

2.4.1.3 Technical Feasibility

The tools used for the development of the software are easy to understand, as the interfaces designed are user friendly. The commands and the menu provided on the forms are easy to understand and one can learn the things with little experience.

2.4.1.4 Operational Feasibility

The operational feasibility determines the availability of information, accuracy, efficiency, control of the system and services required by the College.

2.5 Detail Study Phase

Analysis involves interviewing the clients and end users. The people working in the college and the existing documents are the main source of information about the system for the analysts. Analysts investigate a problem by asking context-free questions that is, a set of questions that will lead to a basic understanding of the problem. The process of asking the questions and interviewing continues until the analyst feels that necessary information has been obtained. For example, he might ask that: -

a. How the system is presently working?

b. What is the procedure for intake of cadets?

c. How they are allotted a number/ company?

d. Who is the key person responsible in each wing to ensure that all activities the wing is responsible to undertake are being done?

e. Is there any computerized system working in the college?

f. What are its limitations?

g. How the result is prepared?

h. What are the considerations for preparing the demand of library item?

2.5.1 Working of the Existing System

After detailed study of the complete system, the working of the college can be described in the following paragraphs with the problems and some of the suggested solutions. The college is an academic institution where the cadets come and take medical teaching. These students at graduation join the respective field. Being a military academic institution broadly its working can be divided into following groups: -

a. Intake of cadets.

b. Result Compilation.

c. Library Management.

2.5.2 Intake of Cadets

Army Medical College has four different categories of cadets who are selected through separate exams for MBBS and BDS courses. These cadets are MC, NC, PC, and FS .A cadet after being selected reports to the Army Medical College. Here the student is enrolled in the specific course. Administrative / Cadet Affairs Wing is responsible for allocating cadets numbers to all cadets. This is followed by his living status and allotment of the company to them. They are also responsible to keep an up to date record of discipline, performance, merits, demerits, personal record, previous academic performance, hospital record and leave record.

2.5.3 Comments

Although SOP does exist to enable the wings to work cohesively, but once a detailed study of their working is made, it has been seen that a lot of duplication is being done. Administrative wing and Cadet Affairs wing are mostly super imposing each other which leads to duplication. The problem can be resolved by tasking only those affairs with the Cadet Affairs Wing, which deal with the military training of MC's, allotment of company, discipline, etc. Rest all tasks be given to the administrative wing.

2.5.4 Result Compilation

Each department is responsible for taking exam of its subjects. Later on calculating the marks scored in internal evaluation forwards their respective results to the Headquarters. Who initially compiles the result and also scrutinize it. So in this way following is being done: -

a. Duplicate effort is being made to make / compile /process the result

b. Precious time is being lost.

c. Security hazard.

d. Duplicate Record maintenance.

2.5.5 **Comments**

The problem is accounting for a large number of results and if somebody wants to see a particular result in a certain subject or prof or grade wise, it will take a lot of time to get the required answer.

2.5.6 **Library Management**

Although now a PC has been given to the library but still most of the things are being done manually. Even generation of quarterly/monthly reports is processed manually.

2.5.7 **Comments**

Management of Library has become a very laborious job. Moreover with the advancement going on the library is not fit to go on Internet.

2.6 Summary

The College Organization despite of all this, is effective to keep a control on all the Wings. All Wings are assigned with different duties, which are supervised by Vice Principal Office. The existing system has main problem of compiling of this huge data, which is manually very difficult to compile. The suggested solution provides us an option to tackle with this problem. The problem of timely submission of reports / results can be made possible by networking.

CHAPTER 3

CONCEPTUAL MODEL AND DESIGN

3.1 Introduction

With the preparation of requirement specification document for the software the design phase begins. While the requirement specification activity is entirely in the problem domain, design is the first step to move from the problem domain towards the solution domain. Design is essentially the bridge between requirement specification and the final solution for satisfying the requirements.

3.2 Design Objectives

The design of the system is correct if a system design built satisfies the requirements of that system. So the goal during Design Phase is to produce correct design. Some desirable properties for a software design are as under: -

3.2.1 Completeness

This property requires that all the different components of the design should be specified. There should be no inconsistencies in the design.

3.2.2 Verifiability

This property of design is concerned with how easily the correctness of the design can be achieved.

3.2.3 Efficiency

Efficiency of any system is concerned with the proper use of the system resources. Efficiency is a performance requirement and software should be efficient as is required. The efficiency is imposed with good design and simple coding.

3.2.4 Simplicity And Under- Stand ability

These are the most important properties of the software design. If the software design is simple and understandable, then this will simplify the task of system modification. The maintenance of the product will be easy and maintenance cost of the system can be reduced.

3.3 Design Strategy

Due to implicit nature of the tasks and procedures involved in the system an approach was needed that could mould the existing manual system with the suggested improvements into an automated system without losing the integration between its various components. The requirement was for a well-designed File Management system, which could streamline the existing system and bring in line with the requirement of management to provide them with an update on the current scenario in the AMC and help them to set online queries and readily statistical reports.

Additionally it should be able to provide the operating staff with easier data entry, guaranteeing minimal redundancy of data entry freeing them of the pain of entering the data time and again. The proposed system is a file management system providing an easy to use GUI (Graphical User Interface) to the end users minimizing their efforts in maintaining the data pertinent to the courses and to the management in relieving the information the way they want in a precise and easy manner. To design the proposed system and attain the

desired goals, a bottom up system development approach was adopted started at the scratching details and refining them to the highest level.

3.4 Database Design

Database is the collection of data with some relationship with in the data. Database is used to store data that is required by the system. To be able to successfully design and maintain database, the following steps should be taken: -

a. Identification of data entities of independent nature.

b. Identification of attributes of each data entity.

c. Identify the relationship between the data entities.

3.4.1 Characteristics of the Database Management System

A good database may have the following characteristics: -

a. It represents complex relationship between data.

b. Keeps a tight control of data redundancy.

c. It enforces user-defined rules to ensure the data integrity.

d. It has a centralized data dictionary for the storage of information pertaining to data and its manipulation.

e. It ensures that data can be shared across applications.

f. It enforces data access authorization.

g. It has automatic, intelligent backup and recovery procedures for data.

h. It has different interfaces through which users can manipulate data.

3.5 **Data Models**

There are three types of data models available in the database. These are: -

3.5.1 **Hierarchical Data Model**

This model is based on parent-child relationship. In this model, a parent can have many children but a child can have only one parent. So, there are no many-many relationships between two tables.

3.5.2 **Network Data Model**

This data model can have many relations between different tables. A child table can have multiple parents and a parent can have many children.

3.5.3 **Relational Data Model**

A relational database uses relations or two dimension tables to store information. Dr E. F. Codd first outlined the principle of the relational model in a June 1970 paper called “A Relational Model of Data for Large Shared Data Banks.” In this paper Codd proposed the relational model for the data base systems. It soon became very popular, especially for their ease of use and flexibility in structures. In addition, a number of innovative vendors, such as Oracle, supplemented the RDBMS with a suite of powerful application development and user products, providing a total solution.

3.5.4 **Components of the Relational Model**

a. Components of objects or relations that store data.

b. A set of operators that can act on the relations to produce other relations.

c. Data integrity for accuracy and consistency.

3.5.5 **Terminology Used in a Relational Database**

A relational database can contain one or many tables. A table is the basic storage structure of an RDBMS. A table holds all the data necessary about something in the real world –for example employees, items.

a. A single row or tuple representing all data required for a particular employee. Each row in a table should be identified by a primary key, which allows no duplicate rows.

b. A primary key must contain a value.

c. A column that is not a key value. A column represents one kind of data in a table.

d. A foreign key is a column that defines how tables relate to each other. A foreign key refers to a primary key or a unique key in another table.

e. A field can be found at the intersection of a row and a column. There can be only one value in it.

f. A field may have no value in it. This is called a null value.

3.5.6 **Guidelines For Primary Keys and Foreign Keys**

a. No duplicate keys are allowed in a primary key.

b. Primary keys generally cannot be changed.

c. Foreign keys are based on data values and are purely logical, not physical pointers.

d. A foreign key value must match an existing primary key value or unique key value, or else be null.

3.6 **Characteristics of Relational Database**

In a relational database, we do not specify the access route to the tables and we do not know how the data is arranged physically. To access the database, we execute a structured query language (SQL) statement, which is the American National Standard Institute (ANSI) standard language for operating upon the relational databases. The language contains a large set of operators for partitioning and combining relations. Using the SQL statements can modify the database.

a. Most Data Management System based on the relational model has a built in query support for query languages like ANSI SQL or QBE (Query by Example).

b. Relational model of data management is based on set theory. Built in query language is designed in the RDBMS, so that it can manipulate sets of data.

c. The user interface used with relational models is non-procedural because only what needs to be done is specified and not how it has to be done.

d. Data as well as data security comes under the central control of RDBMS.

e. In the RDBMS, all user requests to insert data in a table or to update, Delete or view data in a table must be routed through the RDBMS engine only. Direct calls for data, cannot be made to the tables

themselves. Hence there is a single point of control when it comes to data manipulation; this gives rise to excellent data security.

3.7 Structured Query Language

SQL allows us to communicate with the server and has the following advantages:

a. Efficient

b. Easy to learn and use.

c. Functionally complete. (SQL allows us to define, retrieve, and manipulate data in the tables).

3.8 Relational Database Management System

Oracle provides a flexible RDBMS. Using its features, we can store and manage data with all the advantages of a relational structure plus PL/SQL, an engine that provides us with the ability to store and execute program units. The server offers the options of retrieving data based on optimization techniques. It includes security features that control how a database is accessed and used. Other features include consistency and protection of data through locking mechanisms. We run its applications on client-server architecture.

3.9 Normalization

The purpose of normalization is to produce a stable set of relations that is a faithful model of the operations of the enterprise. By following the principles of normalization we can achieve a design that is highly flexible, allowing the model to be extended when needed to account for new attributes, entity sets and

relationships. We can also reduce the redundancy in the database and ensure that the design is free of certain update, insertion and deletion anomalies. The following are the normal forms: -

3.9.1 First Normal Form

A relation is in first normal form if and only if every attribute is a single valued for each tuple. This means that each attribute in each row, or each “cell” of the table, contains only one value. No repeating fields or groups are allowed. An alternative way of describing the first normal form is to say that the domains of the attributes of a relation are atomic, that is, they consist of single units that cannot be broken down further.

3.9.2 Second Normal Form

A relation is in second normal form (2NF) if and only if it is in first normal form and every non-primary-key attributes is fully functionally dependent on the primary key. Clearly, if a relation is in 1NF and the key consists of a single attribute, the relation is automatically 2NF. The only time we have to be concerned about 2NF is when the key is composite.

3.9.3 Third Normal Form

A relation is in third normal form (3NF) if it is in second normal form and no non-primary-key attribute is transitively dependent on the primary key.

3.9.4 Boyce-Codd Normal Form

A relation is in Boyce-Codd normal form if and only if every determinant is a candidate key.

3.9.5 Fourth Normal Form

A relation is in fourth normal form (4NF) if and only if it is in Boyce-Codd normal form and there are no nontrivial multi-valued dependencies.

3.9.6 Fifth Normal Form

A relation is in fifth normal form (5NF) if no remaining non-loss projections are possible, except the trivial one in which the key appears in each projection.

3.10 File Design

The whole database consists of a number of tables, which contain appropriate record. The data structure implemented for each of these tables has been explained in this section.

3.10.1 Table-Academic History

This table provides details about the academic history of the selected cadet. Its data structure has been implemented as given below: -

COLUMN NAME	DATA TYPE	SIZE	ATTRIBUTES
No	Number	5	Primary key and uniquely identify an item
Cat	Varchar2	10	Primary key and uniquely identify an item

M_O	Varchar2	20	Not null & name of the course (matric or O level)
M_Session	Varchar2	5	Not null & gives the session
M_Board	Varchar2	25	Not null & Name of the board
M_MKs	Number	10	Not null & marks obtained in matric
O_Grade	Varchar2	10	Not null & grade obtained in O level
M_Percent	Number	10	Not null & percentage in matric
FSc_A	Varchar2	20	Not null & name of the course (FSc or A level)
F_Session	Varchar2	5	Not null & FSc Session
F_Board	Varchar2	25	Not null & gives the Board name
F_Mks	Number	10	Not null &marks in FSc
A_Grade	Varchar2	10	Not null & grade in A level
F_percent	Number	10	Not null & percentage in FSc

3.10.2 Table-Address

This table will contain the details of the address of the cadets. Its data structure has been implemented as given below: -

COLUMN NAME	DATA TYPE	SIZE	ATTRIBUTES
No	Number	5	Primary key and uniquely identify an item
Cat	Varchar2	10	Primary key and uniquely identify an item
Name	Varchar2	25	Not null & name of the cadet
H_No	Varchar2	5	Not null & house address
Street	Varchar2	5	Street number
Town	Varchar2	20	Not null & name of town
The	Varchar2	20	Not null & name of tehsil
Dist	Varchar2	20	Not null & name of District

Tel	Number	10	Telephone number

3.10.3 Table-Address2

This table determines the address of the cadet's parents who are members of armed forces. Its data structure has been implemented as given below: -

COLUMN NAME	DATA TYPE	SIZE	ATTRIBUTES
No	Number	5	Primary key and uniquely identify an item
Cat	Varchar2	10	Primary key and uniquely identify an item
H_No	Varchar2	5	Not null & house address
Street	Varchar2	5	Street number
Town	Varchar2	20	Not null & name of town
The	Varchar2	20	Not null & name of tehsil
Dist	Varchar2	20	Not null & name of District
Tel	Number	10	Telephone number

3.10.4 Table -Batch

This table determines the details of entry, which has reported for the course. Its data structure has been implemented as given below: -

COLUMN NAME	DATA TYPE	SIZE	ATTRIBUTES
C_Entry	Varchar2	10	Primary key and uniquely identify an item
E_No	Number	5	Primary key and uniquely identify an item
Year	Int	10	Year in which entry reported
Start_Date	Date	10	Date of start of the course
End_date	Date	10	Date of end of course
Remarks	Varchar2	100	Any remarks regarding the course

3.10.5 Table - Cadet

This table contains details of cadets who belong to a particular batch. Its data structure has been implemented as given below: -

COLUMN NAME	DATA TYPE	SIZE	ATTRIBUTES
NO	Number	5	Primary key and uniquely identify an item
Cat	Varchar2	50	Primary key and uniquely identify an item
Name	Varchar2	50	Not Null & complete name of the cadet
Gender	Varchar2	10	Not Null & gender of the cadets
Status	Varchar2	10	Not Null & living status of the cadets
Coy	Varchar2	10	Not Null & name of the company in which cadet has been posted too
Country	Varchar2	40	Not Null & name of country to whom the cadets belong
E_No	Number	5	Not Null & entry number

3.10.6 Table - Course

This table contains details of course, which is being run. Its data structure has been implemented as given below: -

COLUMN NAME	DATA TYPE	SIZE	ATTRIBUTES
C_ID	Varchar2	10	Primary key and uniquely identify an item
C_TITLE	Varchar2	40	Not Null & name of the course
Degree	Varchar2	10	Not Null & name of the degree (MBBS or BDS
ABVN	Varchar2	10	Not Null & abbreviated name of the course
Dept	Varchar2	30	Not Null & name of the department
Written	Number	5	Not Null & marks in written exam
VIVA	Number	5	Not Null & marks in viva exam
PROF	Varchar2	10	Not Null & name/ part of professional year

3.10.7 Table – Date Sheet

This table contains details about the date sheet of exams being held in the AMC. Its data structure has been implemented as given below: -

COLUMN NAME	DATA TYPE	SIZE	ATTRIBUTES
C_ID	Varchar2	10	Primary key and uniquely identify an item

PROF	Varchar2	5	Primary key and uniquely identify an item
C_Entry	Varchar2	10	Primary key and uniquely identify an item
E_No	Number	5	Primary key and uniquely identify an item
C_Title	Varchar2	30	Not Null & name of the course
Dept	Varchar2	30	Not Null & name of the department
EX_ID	Varchar2	10	Not Null & identification number of examiner
EX_Name	Varchar2	30	Not Null & name of examiner
P_DATE	Date	10	Not Null & date of the exam
Time	Varchar2	10	Not Null & time of paper

3.10.8 Table – Demerit

This table contains details about the cadet's discipline matters. Its data structure has been implemented as given below: -

COLUMN NAME	DATA TYPE	SIZE	ATTRIBUTES
NO	Number	5	Primary key and uniquely identify an item
CAT	Varchar2	10	Primary key and uniquely identify an item
Date_Of_Punishment	Date	10	Primary key and uniquely identify an item
C_Entry	Varchar2	15	Not Null & Name of the entry
E_No	Number	5	Not Null & Number of the entry

Sec	Varchar2	10	Not Null & number of the section
Punishment	Varchar2	25	Not Null & punishment awarded
Mks_dedc	Number	5	Not Null & marks deducted

3.10.9 Table – Examiner

This table contains details about the examiner. Its data structure has been implemented as given below: -

COLUMN NAME	DATA TYPE	SIZE	ATTRIBUTES
Ex_ID	Varchar2	10	Primary key and uniquely identify an item
Name	Varchar2	30	Not Null & name of the examiner
P_Date	Date	10	Not Null & exam date
C_ID	Varchar2	10	Not Null & Identification number of the Course
C_Title	Varchar2	40	Not Null & Name of the course
P_Type	Varchar2	8	Not Null & Written or practical
C_Entry	Varchar2	10	Not Null & name of the entry
Prof	Varchar2	5	Not Null & name/part of the prof

3.10.10 Table – Faculty

This table contains details about the Faculty, which is detailed to take a course. Its data structure has been implemented as given below: -

COLUMN NAME	DATA TYPE	SIZE	ATTRIBUTES

ID_NO	Varchar2	10	Primary key and uniquely identify an item
TVF_P	Varchar2	5	Not Null & Permanent or temporary visiting faculty
Name	Varchar2	10	Not Null & name of the faculty member
Dept	Varchar2	30	Not Null & unique department name
SPECIALTY	Varchar2	20	Not Null & specialization in any field
T_level	Varchar2	10	Not Null & teaching level of the faculty

3.10.11 Table – Hospital Record

This table contains details about the admission record of cadet in hospital. Its data structure has been implemented as given below: -

COLUMN NAME	DATA TYPE	SIZE	ATTRIBUTES
NO	Number	5	Primary key and uniquely identify an item
Cat	Varchar2	10	Primary key and uniquely identify an item
Date_adm	Date	10	Primary key and uniquely identify an item
Name	Varchar2	15	Not Null & name of cadet
C_Entry	Varchar2	10	Not Null & name of entry
E_No	Number	5	Not Null & Number of entry
Date_Dis	Date	10	Not Null & date of discharge
Disease	Varchar2	10	Not Null & name of disease
Remarks	Varchar2	15	Any remarks

3.10.12 Table – ID Password

This table contains details about the security aspects i.e. identification of password. Its data structure has been implemented as given below: -

COLUMN NAME	DATA TYPE	SIZE	ATTRIBUTES
User_ID	Varchar2	10	Primary key and uniquely identify an item
User_PW	Varchar2	10	Not Null & password of the user
User_Mod	Varchar2	10	Not Null & modified password

3.10.13 Table – Information

This table contains general Information regarding a cadet. Its data structure has been implemented as given below: -

COLUMN NAME	DATA TYPE	SIZE	ATTRIBUTES
NO	Number	5	Primary key and uniquely identify an item
Cat	Varchar2	10	Primary key and uniquely identify an item
NIC	Varchar2	10	Not Null & National identification number
Religion	Varchar2	10	Not Null & religion of cadet
DOB	Varchar2	10	Not Null & date of birth
Domicile	Varchar2	10	Not Null & Domicile province
NOK	Varchar2	25	Not Null & next of kin
Caste	Varchar2	10	Not Null & Caste of the cadet

3.10.14 Table – Leave_Record

This table contains details about the leave record of cadet. Its data structure has been implemented as given below: -

COLUMN NAME	DATA TYPE	SIZE	ATTRIBUTES
NO	Number	5	Primary key and uniquely identify an item
Cat	Varchar2	10	Primary key and uniquely identify an item
S_Date	Date	10	Primary key and uniquely identify an item
Name	Varchar2	15	Not Null & name of cadet
C_Entry	Varchar2	10	Not Null & name of entry
E_No	Number	5	Not Null & Number of entry
Type_Of_Leave	Varchar2	5	Not Null & Type of leave
E_date	Date	5	Not Null & last date of leave
Total_days	Number	5	Not Null & total number of days
Remarks	Varchar2	15	Any remarks

3.10.15 Table – Merits

This table contains details about the merit points achieved by cadet. Its data structure has been implemented as given below: -

COLUMN NAME	DATA TYPE	SIZE	ATTRIBUTES
NO	Number	5	Primary key and uniquely identify an item
CAT	Varchar2	10	Primary key and uniquely identify an item
Date_Of_Award	Date	10	Primary key and uniquely identify an item
Name	Varchar2	15	Not Null & Name of the cadet
Event	Varchar2	25	Not Null & event details

Mks	Number	2	Not Null & number /marks gained
Remarks	Varchar2	25	Any remarks

3.10.16 Table – Parents

This table contains details about the parents of the cadet. Its data structure has been implemented as given below: -

COLUMN NAME	DATA TYPE	SIZE	ATTRIBUTES
NO	Number	5	Primary key and uniquely identify an item
CAT	Varchar2	10	Primary key and uniquely identify an item
Relation	Varchar2	10	Not Null & relation with the cadet
P_Name	Varchar2	25	Not Null & Name of the relative
Rank	Varchar2	10	Not Null & rank of the relative
S_R	Varchar2	5	Not Null & serving or retired details
Occupation	Varchar2	10	Not Null & occupation

3.10.17 Table – P_Appearence

This table contains details about the physical appearance of the cadet. Its data structure has been implemented as given below: -

COLUMN NAME	DATA TYPE	SIZE	ATTRIBUTES
NO	Number	5	Primary key and uniquely identify an item
Cat	Varchar2	10	Primary key and uniquely identify an item
Complexion	Varchar2	10	Not Null & complexion
Color_Eyes	Varchar2	15	Not Null & color of eyes
Color_Hair	Varchar2	10	Not Null & color of hair
Build	Varchar2	10	Not Null & type of built
Blood_gp	Varchar2	10	Not Null & blood group

3.10.18 Table – Relegation

This table contains relegation details of the cadet. Its data structure has been implemented as given below: -

COLUMN NAME	DATA TYPE	SIZE	ATTRIBUTES
NO	Number	5	Primary key and uniquely identify an item
Cat	Varchar2	10	Primary key and uniquely identify an item
Date_Of_R	Date	10	Primary key and uniquely identify an item
Name	Varchar2	15	Not Null & name of cadet

Entry_Old	Varchar2	10	Not Null & name of old entry
O_E_No	Number	5	Not Null & Number of old entry
Reason	Varchar2	25	Not Null & reason
N_E_No	Number	5	Not Null & Number of new entry
New_Old	Varchar2	10	Not Null & name of new entry
Prof	Varchar2	10	Not Null & Prof/part
Remarks	Varchar2	15	Any remarks

3.10.19 Table – Result

This table contains result record of the cadet. Its data structure has been implemented as given below: -

COLUMN NAME	DATA TYPE	SIZE	ATTRIBUTES
NO	Number	5	Primary key and uniquely identify an item
Cat	Varchar2	10	Primary key and uniquely identify an item
C_ID	Varchar2	10	Primary key and uniquely identify an item
Name	Varchar2	30	Not Null & name of cadet

C_Entry	Varchar2	10	Not Null & name of entry
E_No	Number	5	Not Null & Number of entry
NUST_Reg	Varchar2	10	Not Null & unique Registration Number
First_Term	Number	5	Not Null & Number scored in first term
Second_Term	Number	5	Not Null & Number scored in second term
Sendup_Written	Number	5	Not Null & Number scored in send up written exam
Sendup_VIVA	Number	5	Not Null & Number scored in send up viva exam
Final_Written	Number	5	Not Null & Number scored in Final written exam
Final_VIVA	Number	5	Not Null & Number scored in Final viva exam
Prof	Varchar2	10	Not Null & Prof/part

3.10.20 Table – Withdrawal

This table contains withdrawal record of cadet's. Its data structure has been implemented as given below: -

COLUMN NAME	DATA TYPE	SIZE	ATTRIBUTES
NO	Number	5	Primary key and uniquely identify an item

Cat	Varchar2	10	Primary key and uniquely identify an item
Date_Of_W	Date	10	Primary key and uniquely identify an item
Name	Varchar2	15	Not Null & name of cadet
C_Entry	Varchar2	10	Not Null & name of entry
E_No	Number	5	Not Null & Number of entry
Reason	Varchar2	25	Not Null & reason
Prof	Varchar2	10	Not Null & Prof/part
Remarks	Varchar2	15	Any remarks

3.10.21 Table – FD

This table contains record of floppy diskettes held in the library. Its data structure has been implemented as given below: -

COLUMN NAME	DATA TYPE	SIZE	ATTRIBUTES
Access_NO	Number	5	Primary key and uniquely identify an item
No_Of_Copies	Number	5	Not Null & Number of copies held
Month_Of_Production	Varchar2	10	Not Null & Month of production
Title	Varchar2	15	Not Null & title of floppy disc
Remarks	Varchar2	15	Any remarks

3.10.22 Table –Borrow

This table contains record of borrowed material from library. Its data structure has been implemented as given below: -

COLUMN NAME	DATA TYPE	SIZE	ATTRIBUTES
Access_NO	Number	5	Primary key and uniquely identify an item
Borrow_No	Number	5	Primary key and uniquely identify an item
Date	Date	5	Not Null & date on which material is borrowed
F_No/PA_No	Number	10	Not Null & identification number
Remarks	Varchar2	15	Any remarks

3.10.23 Table –Deposit

This table contains record of deposited material back to library. Its data structure has been implemented as given below: -

COLUMN NAME	DATA TYPE	SIZE	ATTRIBUTES
Access_NO	Number	5	Primary key and uniquely identify an item
Depositer_No	Number	5	Primary key and uniquely identify an item
Date	Date	5	Not Null & date on which material is borrowed
F_No/PA_No	Number	10	Not Null & identification number

Remarks	Varchar2	15	Any remarks

3.10.24 Table – V_Cassette

This table contains record of Videocassettes held in the library. Its data structure has been implemented as given below: -

COLUMN NAME	DATA TYPE	SIZE	ATTRIBUTES
Access_NO	Number	5	Primary key and uniquely identify an item
No_Of_Copies	Number	5	Not Null & Number of copies held
Month_Of_Production	Varchar2	10	Not Null & Month of production
Title	Varchar2	15	Not Null & title of floppy disc
Color	Varchar2	5	Not Null & color of the cassette
Duration	Number	5	Not Null & duration in days
Remarks	Varchar2	15	Any remarks

3.10.25 Table – CD

This table contains record of compact disc held in the library. Its data structure has been implemented as given below: -

COLUMN NAME	DATA TYPE	SIZE	ATTRIBUTES

Access_NO	Number	5	Primary key and uniquely identify an item
No_Of_Copies	Number	5	Not Null & Number of copies held
Month_Of_Production	Varchar2	10	Not Null & Month of production
Topics	Varchar2	15	Not Null & topic of CD
Title	Varchar2	5	Not Null & title of the CD
Duration	Number	5	Not Null & duration in days
Remarks	Varchar2	15	Any remarks

3.10.26 Table – MicroFilm

This table contains record of Micro Films in the library. Its data structure has been implemented as given below: -

COLUMN NAME	DATA TYPE	SIZE	ATTRIBUTES
Access_NO	Number	5	Primary key and uniquely identify an item
No_Of_Copies	Number	5	Not Null & Number of copies held
Month_Of_Production	Varchar2	10	Not Null & Month of production
Color	Varchar2	15	Not Null & color of microfilm
Title	Varchar2	5	Not Null & title of the CD
Duration	Number	5	Not Null & duration in days
Remarks	Varchar2	15	Any remarks

3.10.27 Table – A_Cassette

This table contains record of audiocassettes in the library. Its data structure has been implemented as given below: -

COLUMN NAME	DATA TYPE	SIZE	ATTRIBUTES
Access_NO	Number	5	Primary key and uniquely identify an item
No_Of_Copies	Number	5	Not Null & Number of copies held
Month_Of_Production	Varchar2	10	Not Null & Month of production
Title	Varchar2	5	Not Null & title of the CD
Duration	Number	5	Not Null & duration in days
Remarks	Varchar2	15	Any remarks

3.10.28 Table – Journals/Periodicals

This table contains record of Journals/Periodicals in the library. Its data structure has been implemented as given below: -

COLUMN NAME	DATA TYPE	SIZE	ATTRIBUTES
Access_NO	Number	5	Primary key and uniquely identify an item
No_Of_Copies	Number	5	Not Null & Number of copies held

Month_Of_Production	Varchar2	10	Not Null & Month of production
Title	Varchar2	5	Not Null & title of the CD
Topics_Covered	Varchar2	10	Not Null & Topics
Remarks	Varchar2	15	Any remarks

3.10.29 Table – Built

This table contains record of type of built of material in the library. Its data structure has been implemented as given below: -

COLUMN NAME	DATA TYPE	SIZE	ATTRIBUTES
Access_NO	Number	5	Primary key and uniquely identify an item
Dimension	Number	5	Not Null & dimension
Notes	Varchar2	10	Any notes regarding material
Pages	Number	10	Not Null & number of pages
A_Me_Trial	Varchar2	10	Not Null & Trials
Vol	Number	5	Number of volumes
Remarks	Varchar2	15	Any remarks

3.10.30 Table – Book

This table contains record of Books in the library. Its data structure has been implemented as given below: -

COLUMN NAME	DATA TYPE	SIZE	ATTRIBUTES
Access_NO	Number	5	Primary key and uniquely identify an item
Copies	Number	5	Not Null & number of copies
Doc_NoNotes	Number	10	Not Null & number of document

3.10.31 Table – Publisher

This table contains record of Publishers of whom material is lying in the library. Its data structure has been implemented as given below: -

COLUMN NAME	DATA TYPE	SIZE	ATTRIBUTES
Name	Varchar2	10	Primary key and uniquely identify an item
Address	Varchar2	5	Primary key and uniquely identify an item
Date	Date	5	Not Null & Date of publication

3.10.32 Table – Info

This table contains record of information of material in the library. Its data structure has been implemented as given below: -

COLUMN NAME	DATA TYPE	SIZE	ATTRIBUTES
Access_NO	Number	5	Primary key and uniquely identify an item
Language	Varchar2	5	Not Null & language used
ISBN	Number	10	Not Null & ISBN number
Edition	Number	10	Not Null & number of edition
Type_Of_Document	Varchar2	10	Not Null & Type of document
Document_No	Number	5	Not Null & document number
Title	Varchar2	15	Not Null & title of the material

3.10.33 Table – Author

This table contains record of author's information of material in the library. Its data structure has been implemented as given below: -

COLUMN NAME	DATA TYPE	SIZE	ATTRIBUTES
Access_NO	Number	5	Primary key and uniquely identify an item
Author1	Varchar2	5	Not Null & name of author1
Role1	Varchar2	10	Not Null & rolel
Author2	Varchar2	5	Not Null & name of author2
Role2	Varchar2	10	Not Null & role2

Author3	Varchar2	5	Not Null & name of author3
Role3	Varchar2	10	Not Null & role3
Corporate_Author	Varchar2	10	Not Null & name author

3.10.34 Table – Subject

This table contains subject-wise material information. Its data structure has been implemented as given below: -

COLUMN NAME	DATA TYPE	SIZE	ATTRIBUTES
Access_NO	Number	5	Primary key and uniquely identify an item
Series	Number	5	Not Null & series number
No	Number	5	Not Null & number
Subject_Heading	Varchar2	5	Not Null & name of subject heading
Keywords	Varchar2	10	Not Null & keywords used
Description	Varchar2	5	Not Null & description
Remks	Varchar2	10	Any remarks

3.10.35 Table – Cadet_BD

This table contains cadets borrow and deposit record of library material. Its data structure has been implemented as given below: -

COLUMN NAME	DATA TYPE	SIZE	ATTRIBUTES
Access_NO	Number	5	Primary key and uniquely identify an item
Item	Varchar2	10	Not Null & name of item
Title	Varchar2	90	Not Null & title of the material
CadNo	Number	10	Not Null & number of the cadet
CadCat	Varchar2	5	Not Null & category of cadet
CadName	Varchar2	25	Not Null & name of cadet
Cadentry	Varchar2	20	Not Null & entry of the cadet
Date_of_issue	Date	5	Not Null & date of issue
Date_of_return	Date	5	Not Null & date of return

3.10.36 Table – Faculty_BD

This table contains Faculty borrow and deposit record of library material. Its data structure has been implemented as given below: -

COLUMN NAME	DATA TYPE	SIZE	ATTRIBUTES
Access_NO	Number	10	Primary key and uniquely identify an item
Item	Varchar2	10	Not Null & name of item
Title	Varchar2	90	Not Null & title of the material

FACID	Number	10	Not Null & number of the faculty
FacRank	Varchar2	10	Not Null & rank of faculty
FACDEPT	Varchar2	15	Not Null & name of department
Date_of_issue	Date	5	Not Null & date of issue
Date_of_return	Date	5	Not Null & date of return

3.11 DATA DICTIONARY

Oracle data dictionary is a group of tables and views that contain information about the database. The ORACLE creates these tables and views when the database is created. The data dictionary describes tables, columns, indexes, clusters, users and access privileges. ORACLE automatically updates it, whenever one of these objects is created, modified and updated. Thus the data dictionary always contains a current description of the database.

3.13 Controlling User Access

In a multiple user environment a data base administrator is a top level and have all the privileges to control the database that includes creation of new tables, updating of data etc. He can create the users and allot some of privileges, which he is also entitled. Oracle server database security does the following:

a. Control database access.

b. Give access to specific objects in the database.

c. Confirm given and received privileges with oracle data dictionary.

The DBA has high-level system privileges:

a. Create new users

b. Remove Users

c. Remove tables

d. Backup tables

The DBA can create new users as per the requirement and can allot them with the passwords.

3.14 Design Strategy

The design strategy has been evolved keeping in view the existing working of the College. Earlier as the working of the College was broadly divided into following areas: -

a. Administration Wing

b. Academic Wing

c. Cadet Affair Wing

d. Library being under Academic Wing

Since these were the major areas identified and the database developed is also having relevance to it. Different tables are created to meet the requirements in a simple manner. However after analyzing the

system, and seeing the amount of workload we have categorized the present working system into three main blocks which are as under: -

a. Administration Wing

b. Academic Wing

c. Library Wing

The whole problem can be understood with the help of the data flow diagrams and entity relationship diagrams given at the end of this chapter.

3.15 Oracle 8i

Oracle 8 is the first object capable database developed by the Oracle. Oracle 8 provides a new engine that brings object oriented programming, complex data types, complex business objects, and full compatibility with the relational world. Oracle 8 extends Oracle 7in many ways. Data warehouse applications will benefit from enhancements such as parallel execution of insert, update, and delete operations, partitioning, and parallel-aware query optimization. Operating within the Network Computing Architecture (NCA) framework. Oracle 8 supports client-server and Web-based applications that are distributed. Oracle 8 can scale tens of thousands of concurrent users, and can handle any type of data, including text, spatial, image, sound, video, and time series as well as traditional structured data.

3.16 Oracle A Complete Solution

The Oracle relational database management system is the Oracle core product. It includes the Oracle Server and several tools intended to assist the users in the maintenance, monitoring and actual use of the

data. The oracle data dictionary is one of the most important components of the server. It consists of a set of tables and views that provide a read-only reference to the database.

The RDBMS handles tasks such as the following:

a. Managing the storage and definition of data.
b. Controlling and restricting data access and concurrency.
c. Providing backup and recovery.
d. Interpreting SQL and PL/SQL statements.

All programs and users to access and manipulate data stored in the Oracle database use SQL and PL/SQL statements. Using application programs, we can access the database without directly using SQL or PL/SQL.

SQL*Plus is an Oracle tool that recognizes and submits SQL and PL/SQL statements to the server for execution and contain its own command language.

Oracle offers a wide variety of state of the art graphical, user interface (GUI) driven tools to build business applications as well as large suite of software applications for many areas of business and industries.

3.17 **Language Used**

Oracle 8i and developer 2000 has been selected for the reason mentioned above. At the moment, it is a Client-Server environment in which there is a central server with its workstations in the three groups. The server is holding whole record and the workstations can only view the data placed there. This has been done

due to the security reason, however the facility of entering and updating the data is also provided to the client, but only in its own domain.

3.18 **Features Of Oracle**

Oracle has following few features:

a. Oracle provides variable length data types such as Varchar2; so variable length records can be entered. This results in the efficient handling of the memory.

b. Oracle utilizes the power of SQL with Procedural Language PL/SQL. The SQL is a nonprocedural language, but in PL/SQL, SQL commands can be used in a procedural way.

c. Oracle makes the integrity of data secure in such a way that when a table is defined, then its name can never be changed. If the table contains the data then size of its attributes cannot be decreased although it may be increased.

d. Oracle provide the feature of data hiding by providing the 'view' object in which attributes of various tables can be combined and these attributes can be changed.

Oracle provides the flexibility to define data base triggers, so that behavior of table can be changed according to the requirements.

3.19 **Hardware Used**

a.	Server	Pentium III 128 MB RAM 100 MB/sec NW Card 20 GB Hard Disk Colored Monitor 15"

b. Workstations Pentium III

128 MB RAM

100 MB/sec NW Card

20 GB Hard Disk

Colored Monitor 15”

(Note: At the moment, 3xworkstations are advisable)

c. Switch 36ports(Instead Of Hub) D-Link

d. NW card D-Link

e. Cables/accessories for LAN

f. HP Laser Jet 4100 series printer (Quantity-One)

DIAGRAMATIC LAYOUT

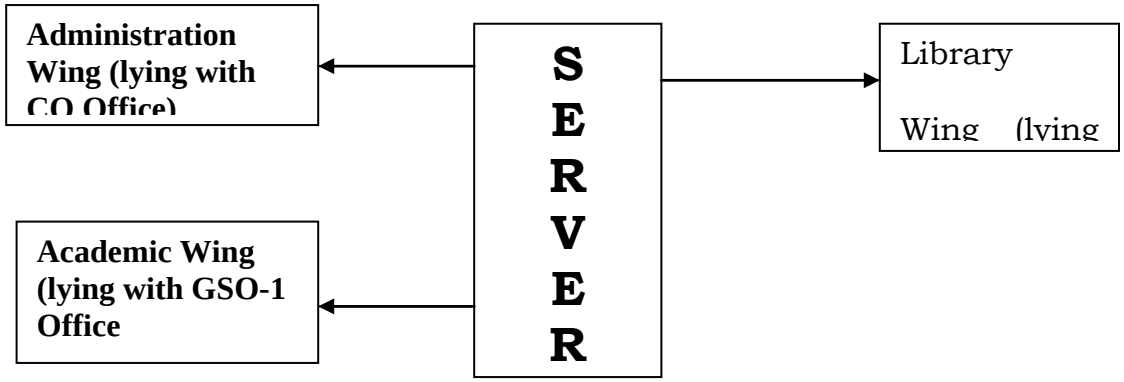


Fig 3.2 Proposed Layout of the workstations

3.20 SUMMARY

An efficient database should fulfill all the design objectives. Relational data model should serve the basis for further designing the database. It uses relations or two dimension tables to store the information. Relations are made of different entities. The primary keys and foreign keys are selected basing on these tables, are normalized. After the normalization data flow diagrams and entity relationship diagrams are made. Oracle is the software, which supports RDBMS.

CHAPTER 4

IMPLEMENTATION AND RESULTS

4.1 Introduction

File Management system is developed keeping in view the requirements of clients/users. The screens should be user friendly and easy to understand for a person with average general knowledge about the computers. Once the file management system is developed, the major task is of data entries. These are to be made by the Data entry Operators and should be simple to enter.

Developer 2000 provides us the requisite information about handling of the database; it includes data entries that are forms and the reports, which are the output of the data placed in the database. There are basically two portions of the project:

a. **Forms** These are basically used to enter the information about the items like cadet's name, Prof result, books issued in library etc.

b. **Reports** These are the accumulated results of the data stored in the Database. These are retrieved in the manner the user has perceived of a filing system. The fields can be included/deleted, once the need arises by making modification in SQL Query, which is the main basis for the generation of a report. Here the fields are easily included provided those fields exists in the table structures.

4.2 Menu

Before going on to the main working of the file management system, one should be conversant with the menus available in the database. There are two Main Menus available:

a. Screen Top level Menu (Descriptive)

b. Iconic Menu

4.2.1 Screen Top level Menu

This is menu available on the top of the screen, once we log on to the database. This is in the form of drop down menus against each category.

a. **File** Once on the main menu, action is clicked by mouse, a drop down menu appears which have following choices:

1. **Clear All**: It uses to clear all the entries available on the screen.
2. **Save**: It is used to save data.
3. **Print**: It is the print command of the required form.
4. **Exit**: To quit from the inventory system.
5. **Main Adm** It is used to go on to the administration screen.
6. **Main Trg** It is used to go on to the academic screen.
7. **Main Library** It is used to go on to the Library screen.
8. **Main** It is used to go on to the main screen.

b. **Edit**

Once on the main menu, mouse clicks edit, a drop down menu appears which have following choices: -

1. **Cut** To delete some of the selected data/text.
2. **Copy** To copy some of the selected data/text.
3. **Paste** To paste the deleted portion/cut portion as per the requirement.

4. **Clear** To clear any field of the record.

5. **Duplicate** To prepare a duplicate copy of selected potion.

6. **Undo** To undo any change recently.

c. **New**

Once on the main menu, mouse clicks new, a drop down menu appears which have following choices: -

1. **Entry** It will take us to entry form.
2. **Class** It will take us to class form.
3. **Faculty** It will take us to Faculty form.
4. **Cadet** It will take us to cadet form.
5. **Subject** It will take us to subject form.
6. **Examiner** It will take us to Examiner form.
7. **Exam** It will take us to exam form.
8. **Date Sheet** It will take us to date sheet form.

d. **Field** Once on the main menu, field is clicked by mouse, a drop down menu appears which have following choices:

1. **Previous**: it moves to the last block.
2. **Next**: it moves on to the next block.
3. **Clear**: Clear block.

e. **Search**. Once on the main menu, search is clicked by mouse, a drop down menu appears which have following choices:

1. **Cadet** It opens the cadet form.
2. **Faculty** It opens the Faculty form.
3. **MBBS** It opens the MBBS form.
4. **BDS** It opens the BDS form.
5. **Class MBBS** It opens the class MBBS form.
6. **Class BDS** It opens the class BDS form.
7. **Merits** It opens the merits form.
8. **Demerits** It opens the demerits form.
9. **Book** It opens the following forms: -
   a. **By Title**. It opens the title form.
   b. **By Author**. It opens the author form.
   c. **By Publisher**. It opens the publisher form.
   d. **By Access No**. It opens the access number form.
   e. **By Subject.** It opens the subject form.
9. **J_Periodicals** It opens the periodicals form.
10. **V_Cassette** It opens the videocassette form.
11. **CD** It opens the compact disc form.
12. **Micro Film** It opens the Microfilm form.
13. **Floppy Disk** It opens the floppy disk form.

f. **Input** Once on the main menu, Input is clicked by mouse, a drop down menu appears which have following choices:

1. **Cadet Detail**: It opens the cadet detail form.
2. **Cadet Info** It opens the cadet Information form.
3. **Physical Appearance** It opens the cadet appearance form.
4. **Academic History** It opens the cadet academic history form.
5. **Home Address** It opens the Home address form.
6. **Parent** It opens the cadet parent form.
7. **Parent Address** It opens the Parent address form.
8. **Leave Record** It opens the Leave record form.
9. **Hospital Record** It opens the cadet Hospital Record form.
10. **Merits** It opens the merits form.
11. **Demerits** It opens the demerits form.
12. **Relegation** It opens the cadet relegation form.
13. **wdr** It opens the withdrawal record form.
14. **A_Cassette** It opens the audiocassette form.
15. **MBBS Indl** It opens the MBBS Individual form.
16. **BDS Indl** It opens the BDS Individual form.
17. **Class Result** It opens the class Result form.
18. **CDs** It opens the CDs form.

19. **Books** It opens the Books form.
20. **Floppy Disk** It opens the floppy disk form.
21. **A_Cassette** It opens the audiocassette form.
22. **V_Cassette** It opens the videocassette form.
23. **J_Periodicals** It opens the journal/periodicals form.

g. **Report.** Once on the main menu, report is clicked by mouse, a drop down menu appears which have following choices:

1. **Main Report** It opens the main report form.
2. **Outstanding C_Book** It will generate cadet's outstanding book record.
3. **Outstanding F_Book** It will generate Faculty book record.

h. **Help:** Once on the main menu, when the mouse clicks help, a drop down menu appears. This particular field tells us about the keys and error which has occurred.

4.2.2 Icons Menu

Once we bring the cursor on the icon, it shows a tag showing the function of the particular icon:

1. Exit.
2. Print
3. Cut
4. Copy

5. Paste
6. First Record
7. Previous Record
8. Last Record
9. Next Record
10. Save the record/data

4.3 **ORACLE FORMS**

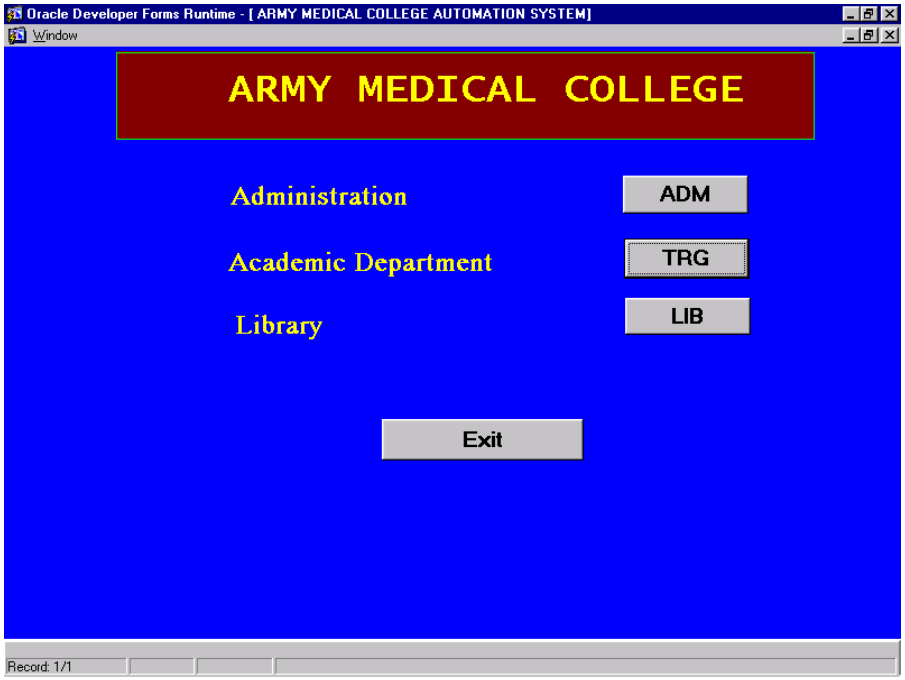
Form is basically a screen layout, to monitor information like data or display objects. A form is a screen based query language and an application generator. Forms are of two types. One is FMX and the other is FMB. Initially one type of form is designed and then it can be run to generate the second form

The database is password-oriented allows only the authorize user to view and update the records. On the start, user introduces himself with some identification, which allows him to logon. Further he gives password and domain in which level he is working Once the user is successfully logged on to database, then he confronts the main screen On the main screen different buttons are designed and each button leads to different function to perform.

4.4 **START SCREEN**

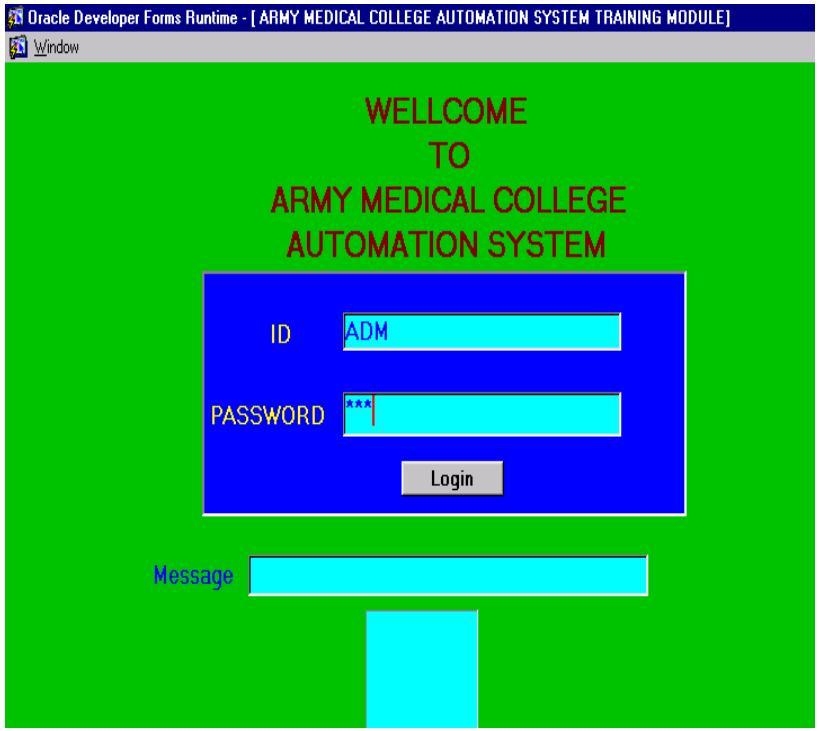
This is the first screen, which opens as the system is switched on. The screen remains on for five seconds and then leads us to main screen, which are as under: -


Oracle Developer Forms Runtime - [ARMY MEDICAL COLLEGE AUTOMATION SYSTEM]
Window
IN THE NAME OF ALLAH
Record: 1/1


Oracle Developer Forms Runtime - [ARMY MEDICAL COLLEGE AUTOMATION SYSTEM]
Window
ARMY MEDICAL COLLEGE
Administration
ADM
Academic Department
TRG
Library
LIB
Exit
Record: 1/1

4.5 LOG-ON SCREEN

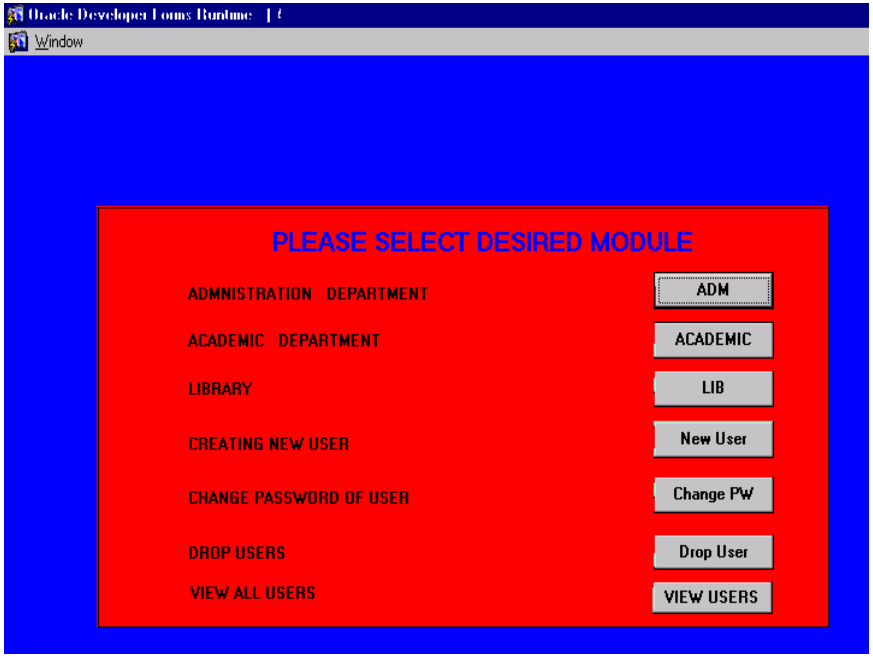
This is the main screen to log-on. This will help us to differentiate between the authorized user and non authorized-user. The authorized user is the one, who has been authorized by the Database administrator to make entries under the definition of the user rights. This successful logon leads to a main screen.



4.6 ADMINISTRATOR SCREEN

The administrator screen will open as we login through the login screen. This is the main menu of the database in which there are seven buttons for the forms. The forms are also report oriented which makes calculation at their own place and sometimes the end-user feels it necessary to print information about

particular information, in that case the print command in the drop menu can be selected to obtain the desired report without much problem. The linkages to the forms are basically from the three buttons but the alternate linkage to the different forms is also given from the drop down menu because sometimes one require information without going to the main screen.

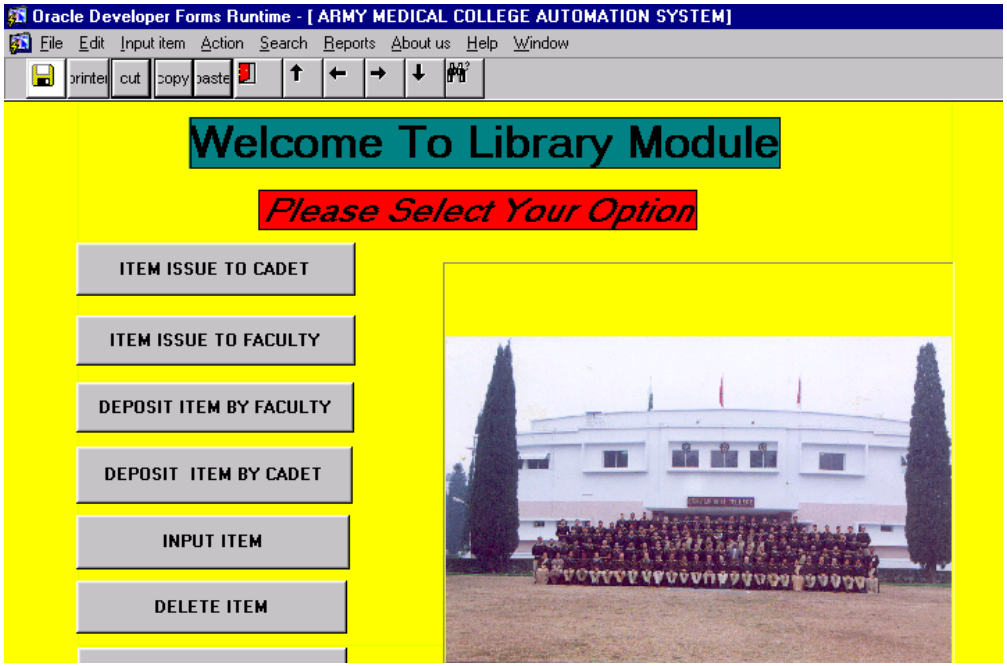


4.7 **ADM SCREEN** On clicking ADM button we will go to ADM screen which is as under:-

4.8 **TRG SCREEN** On clicking trg button it will take us to Trg screen which is as under: -

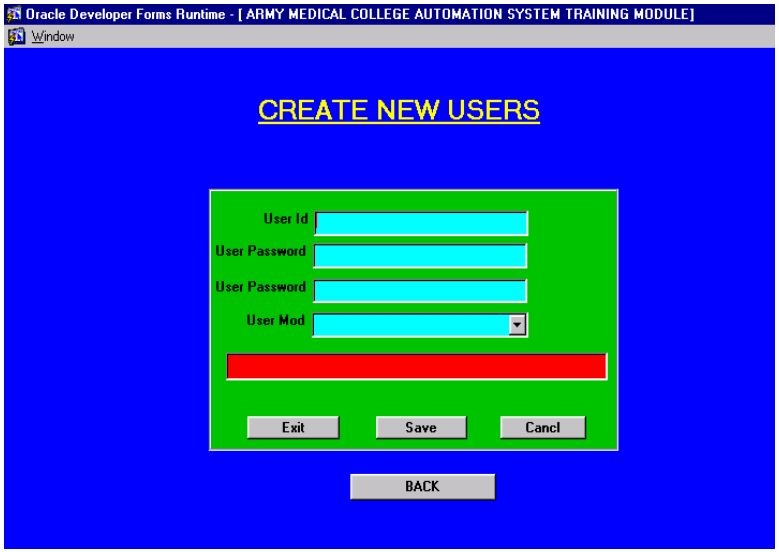
4.9 LIBRARY SCREEN

On clicking lib button it will take us to library screen, which is as under: -

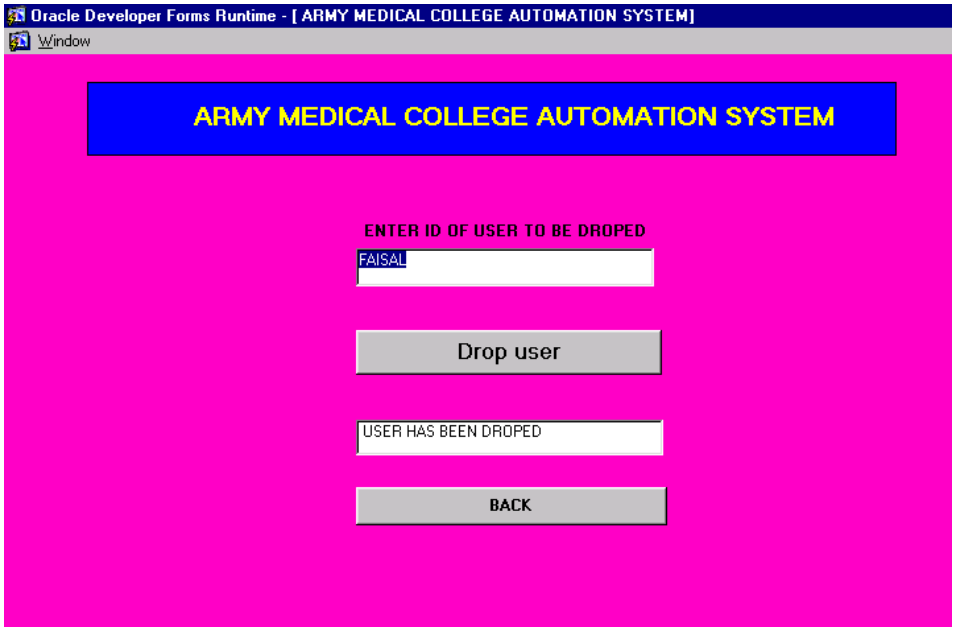


4.10 NEW USER

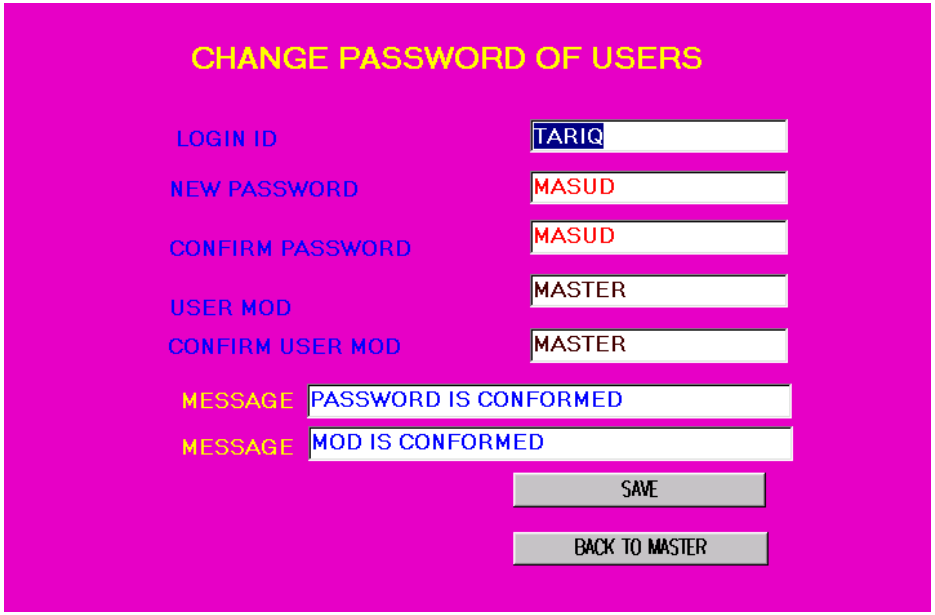
On clicking new user button it will take us to new user screen which is as under: -



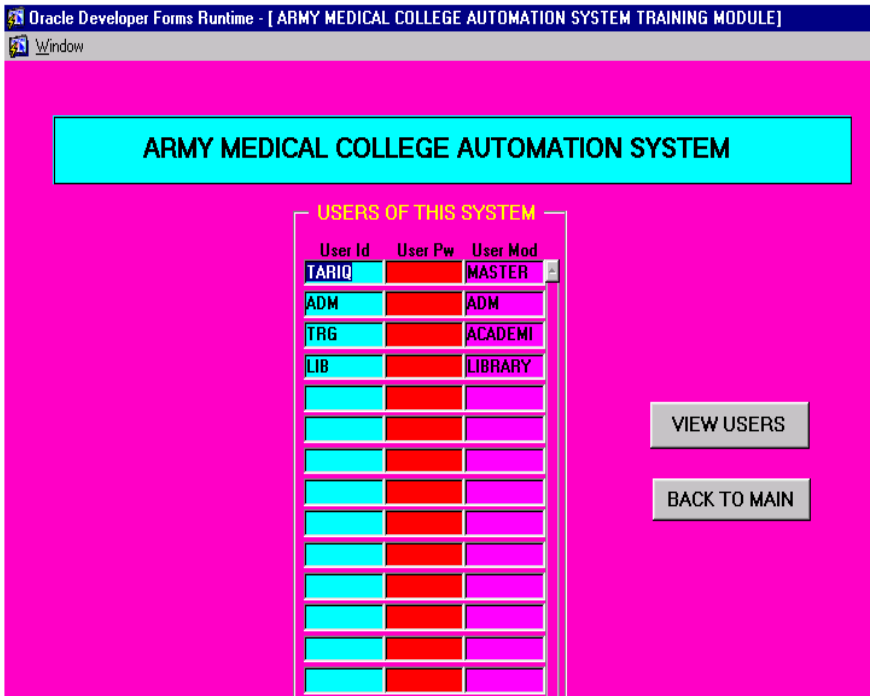
4.11 **DROP USER** On clicking drop user button it will take us to drop user screen, which is as under: -



4.12 **CHANGE PASSWORD** On clicking change password button it will take us to change password screen, which is as under: -

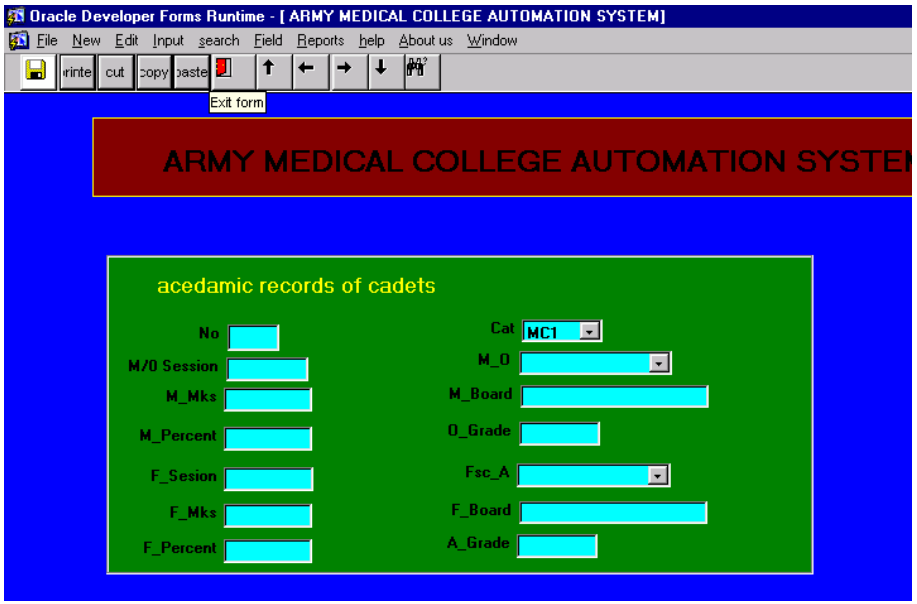


4.13 **VIEW USERS** On clicking view users button it will take us to view users screen, which is as under: -

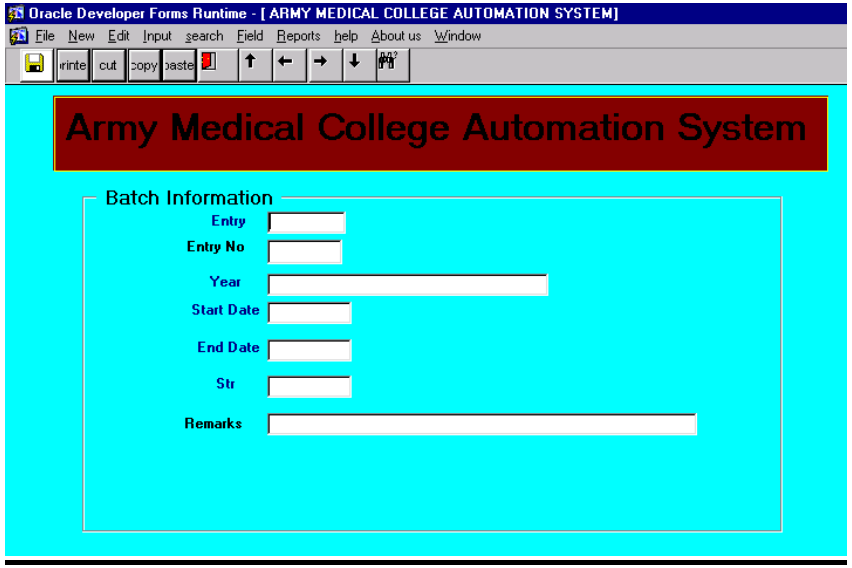


4.14 **ADMINISTRATION WING** The Administration wing has following screens.

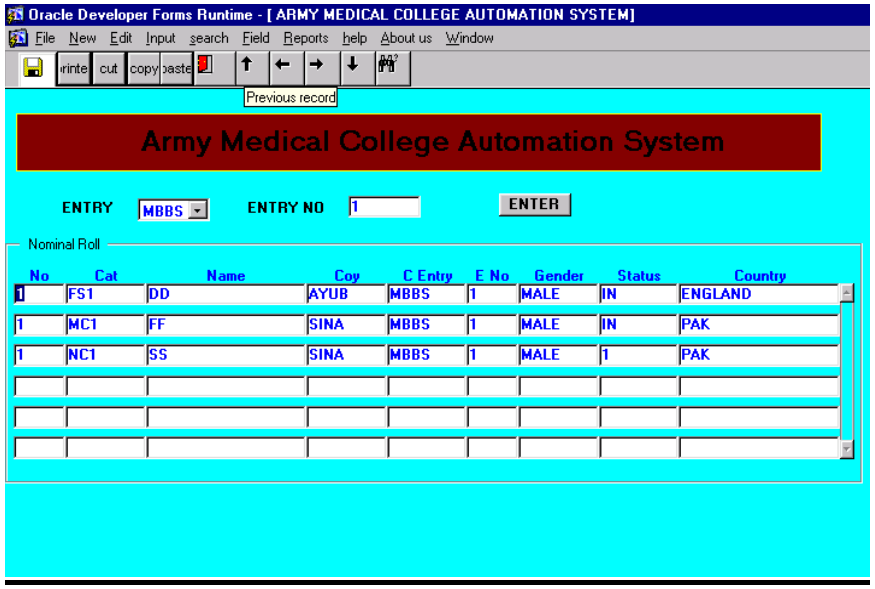
4.14.1 **ACADEMIC HISTORY**



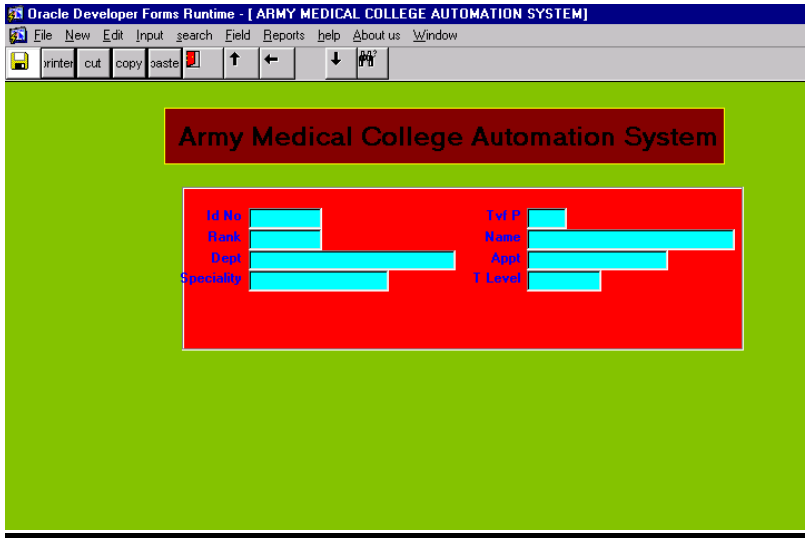
4.14.2 **BATCH**



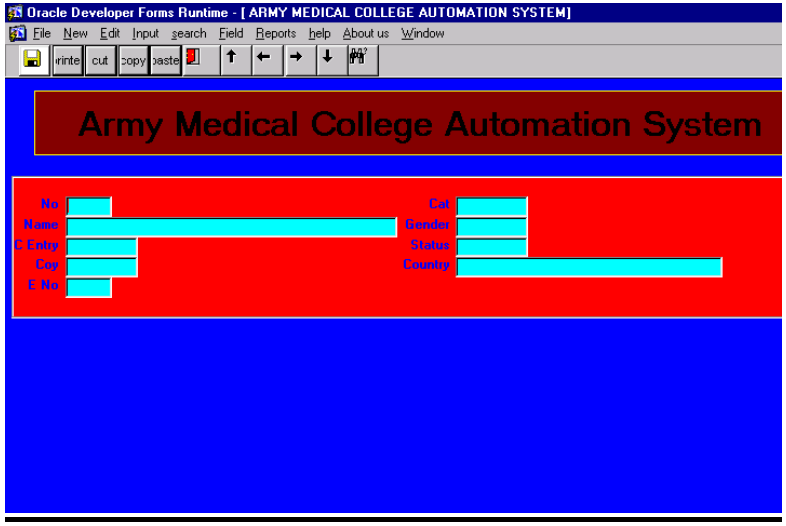
4.14.3 CLASS DATA INPUT



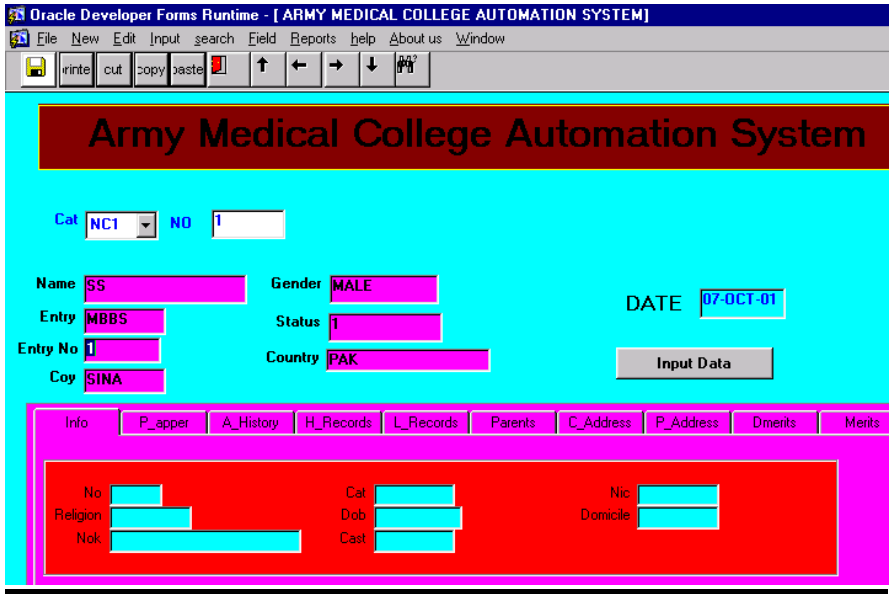
4.14.4 NEW FACULTY



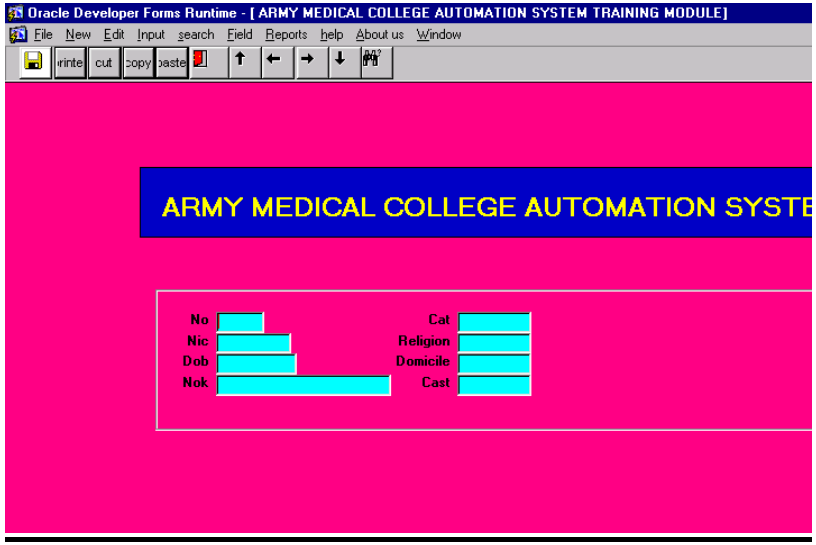
4.14.5 NEW CADET



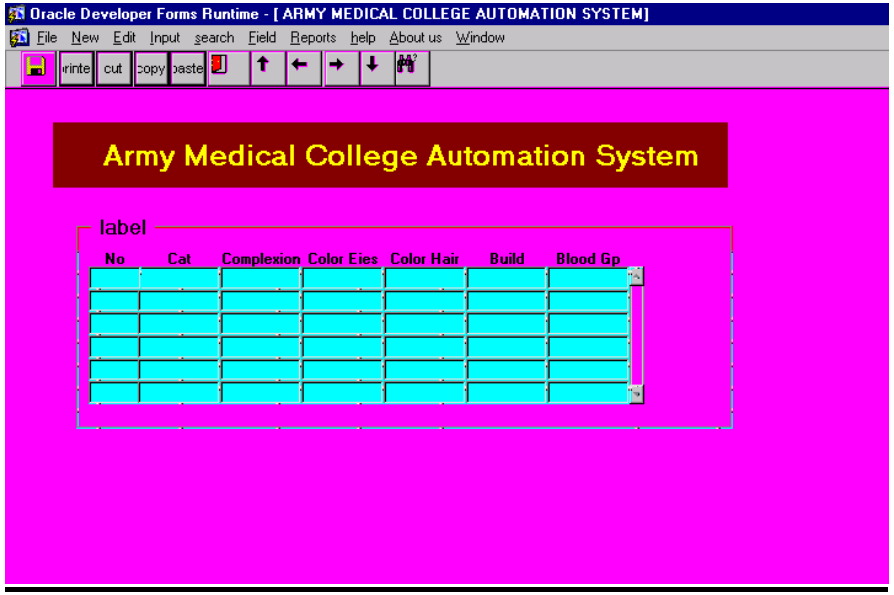
4.14.6 **CADET DETAIL INPUT**



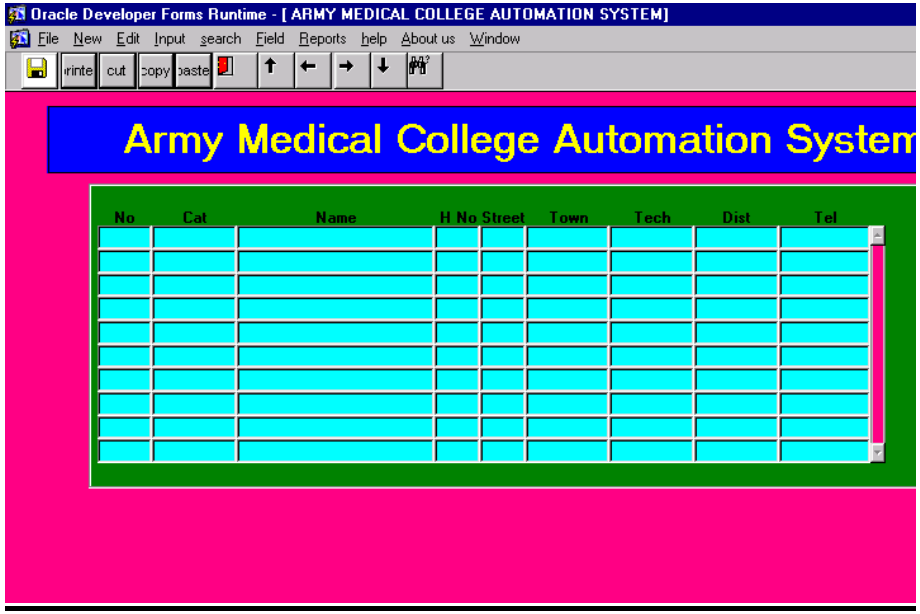
4.14.7 **CADET INFORMATION**



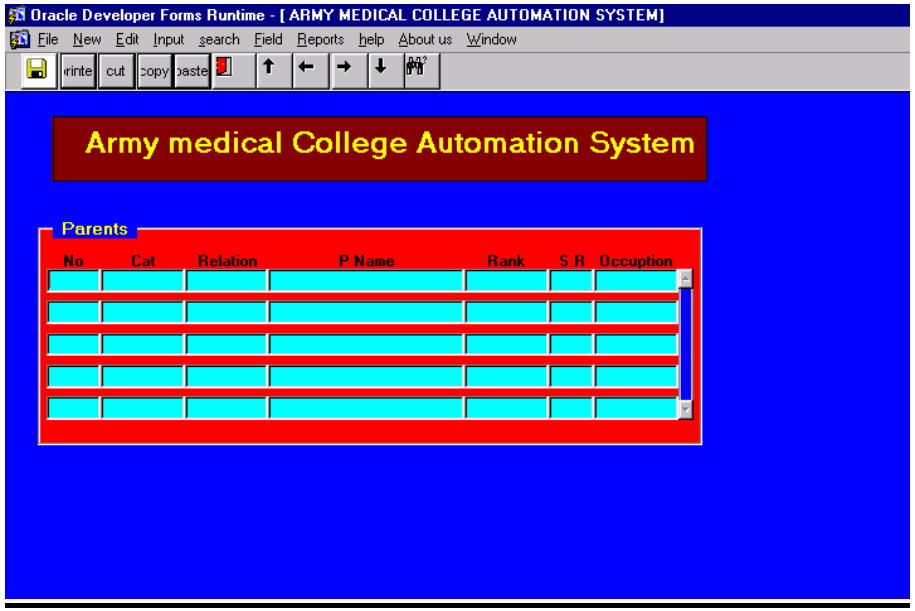
4.14.8 **PHYSICAL APPEARANCE**

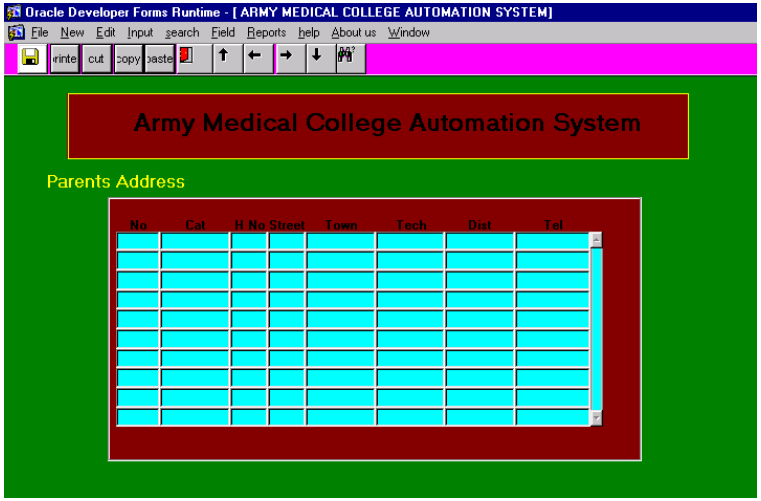


4.14.9 **HOME ADDRESS**



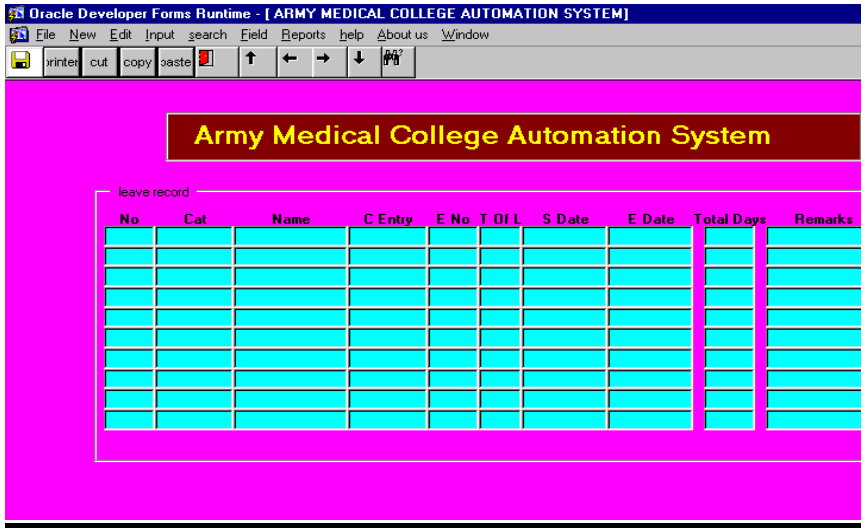
4.14.10 **PARENTS**



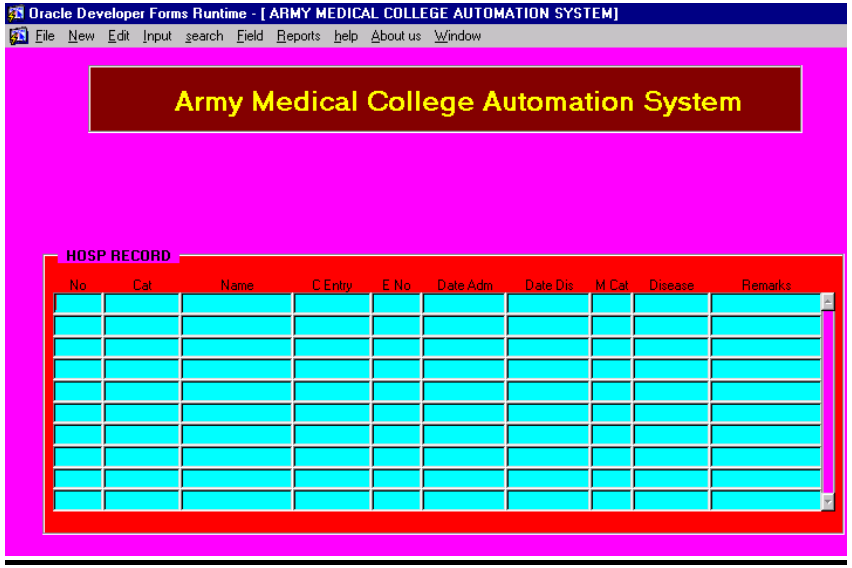


4.14.11 PARENTS ADDRESS

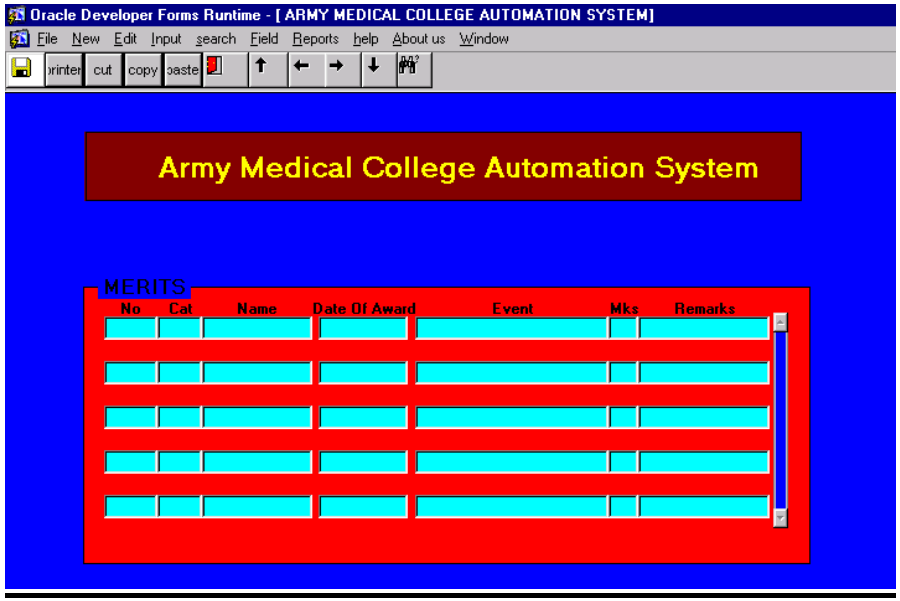
4.14.12 LEAVE RECORD



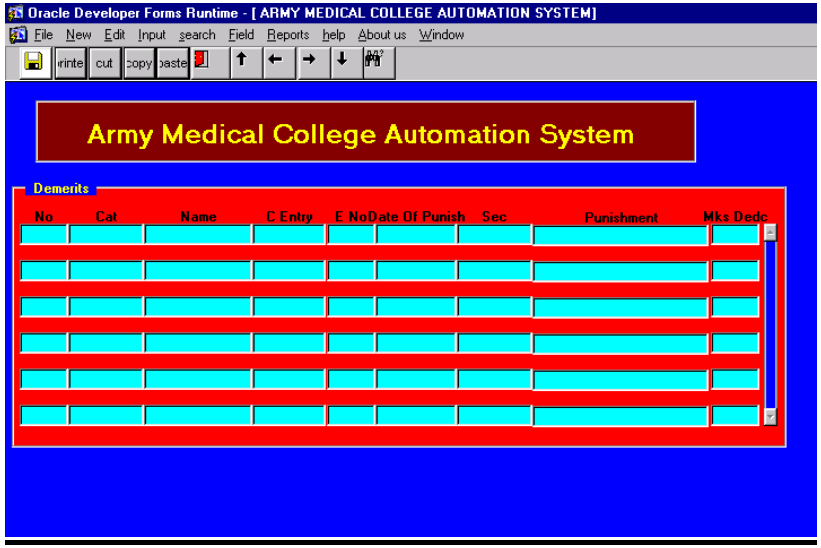
4.14.13 HOSPITAL RECORD



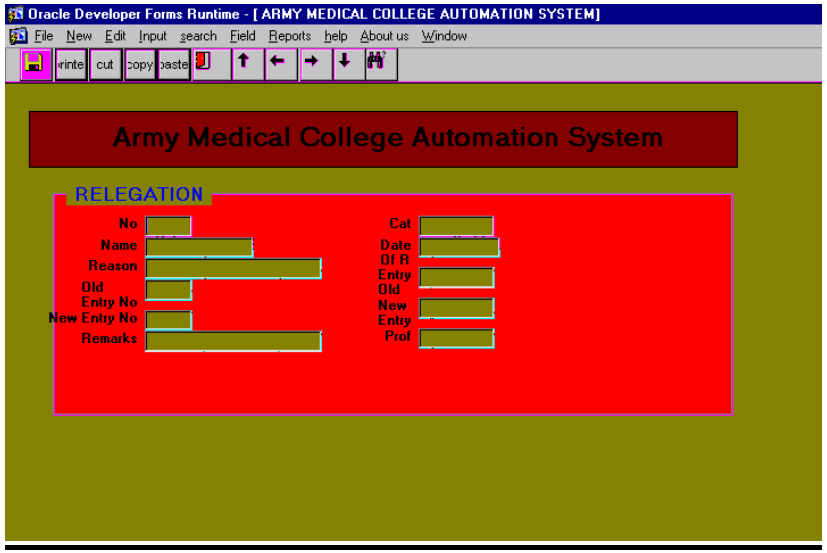
4.14.14 **MERITS**



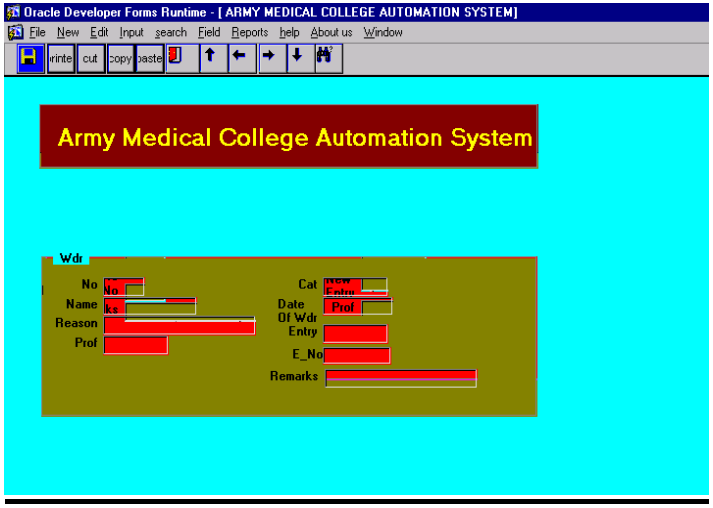
4.14.15 **DEMERITS**



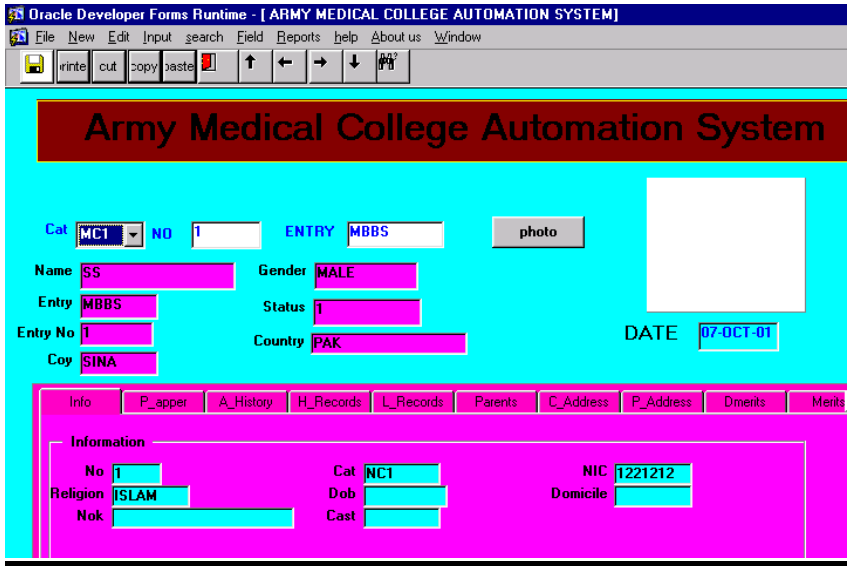
4.14.16 **RELEGATION**



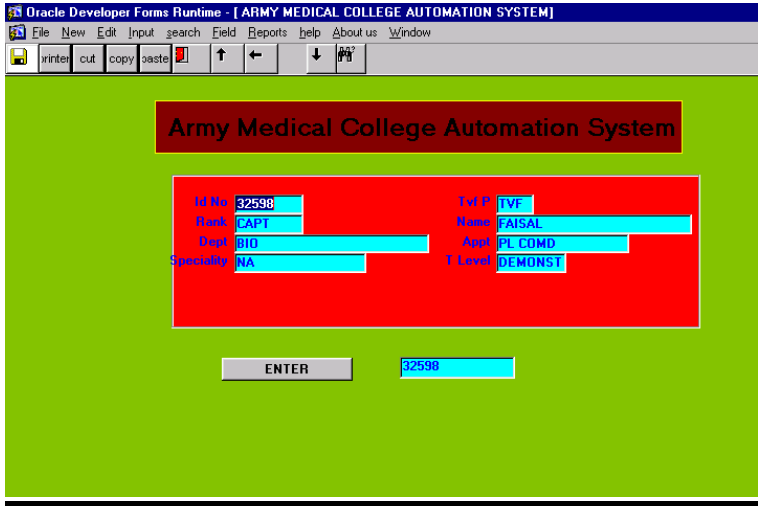
4.14.17 **WITHDRAWAL**



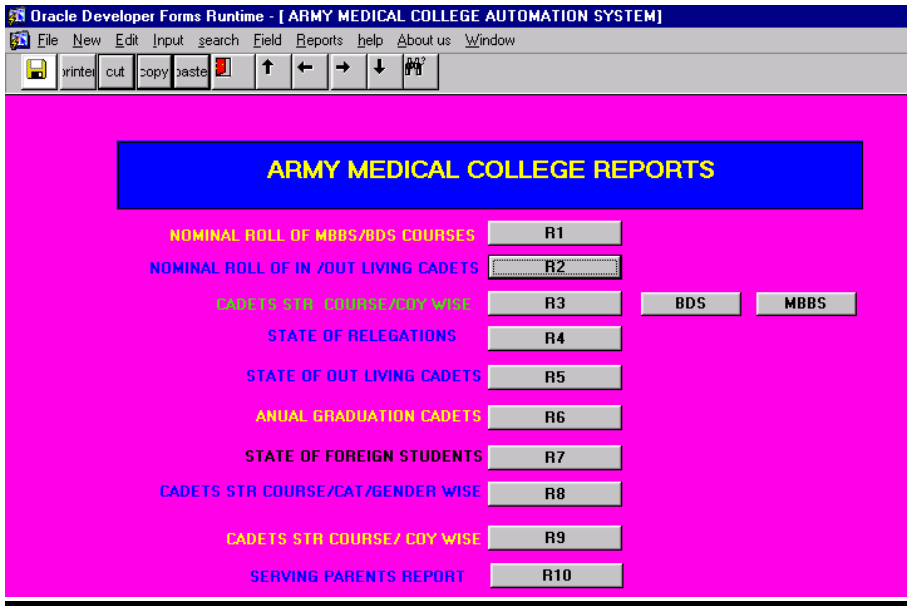
4.14.18 **CADET DATA SEARCH**



4.14.19 **SEARCH FACULTY**

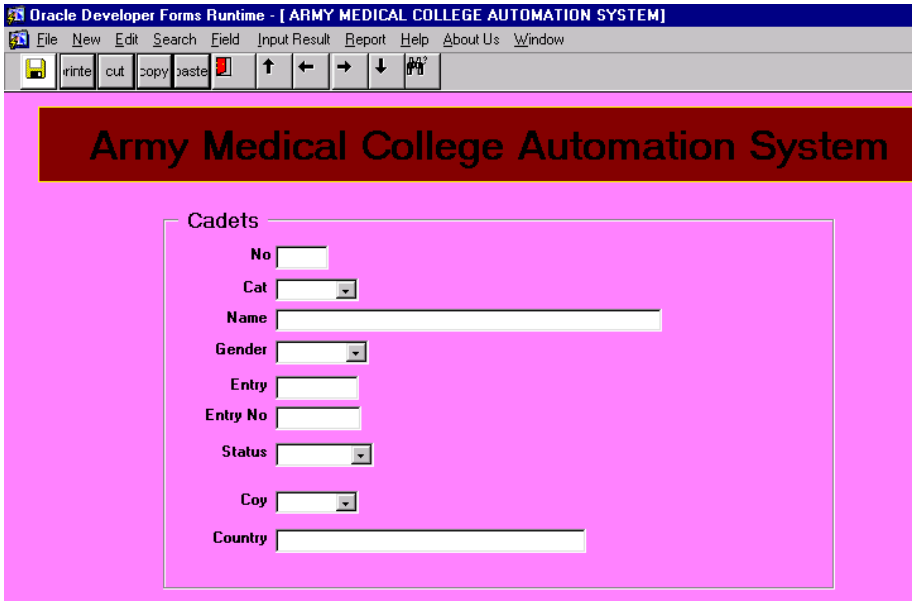


4.14.20 **REPORTS** On clicking the report icon on menu bar it takes us to report screen:-

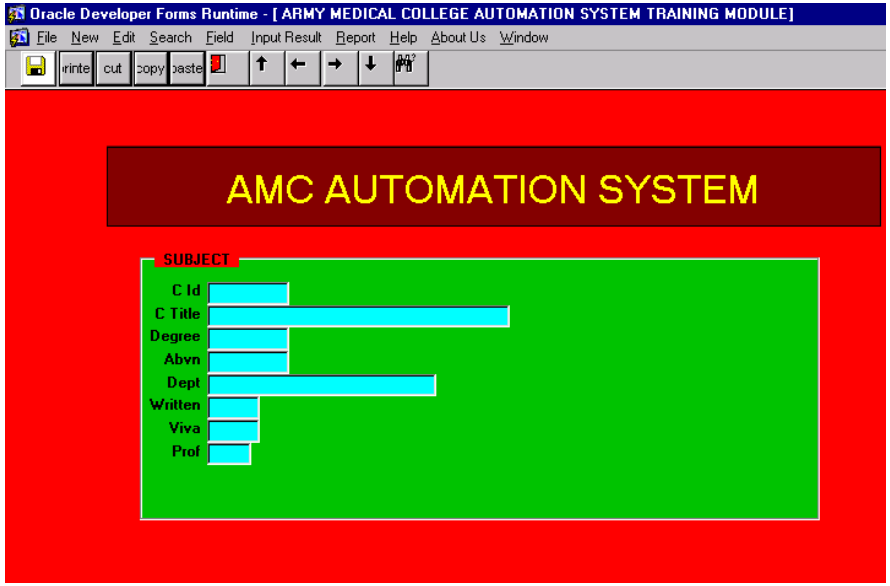


4.15 **ACADEMIC WING** On clicking the academic icon it will take us to the login screen. After the login it will take us to the academic main screen. With the help of the menu bar icons we can go to any of the following forms.

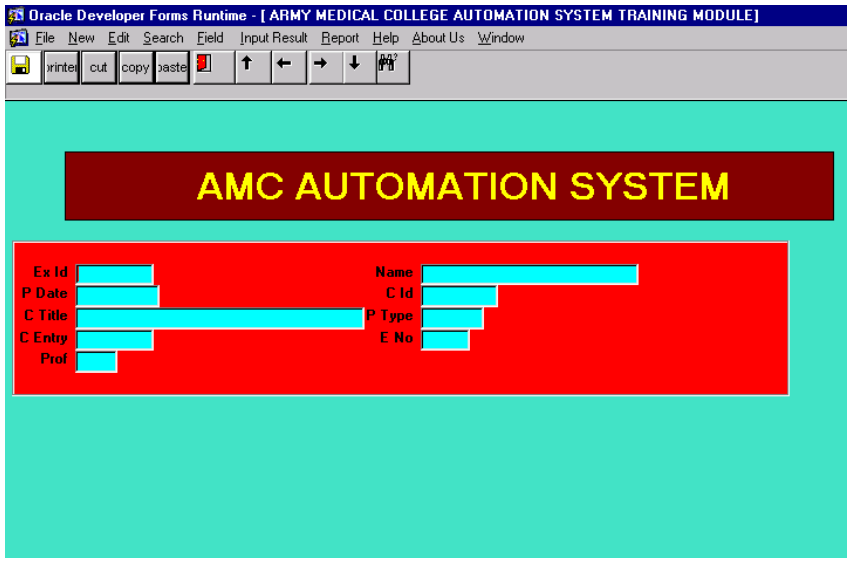
4.15.1 Individual Cadet Input Form



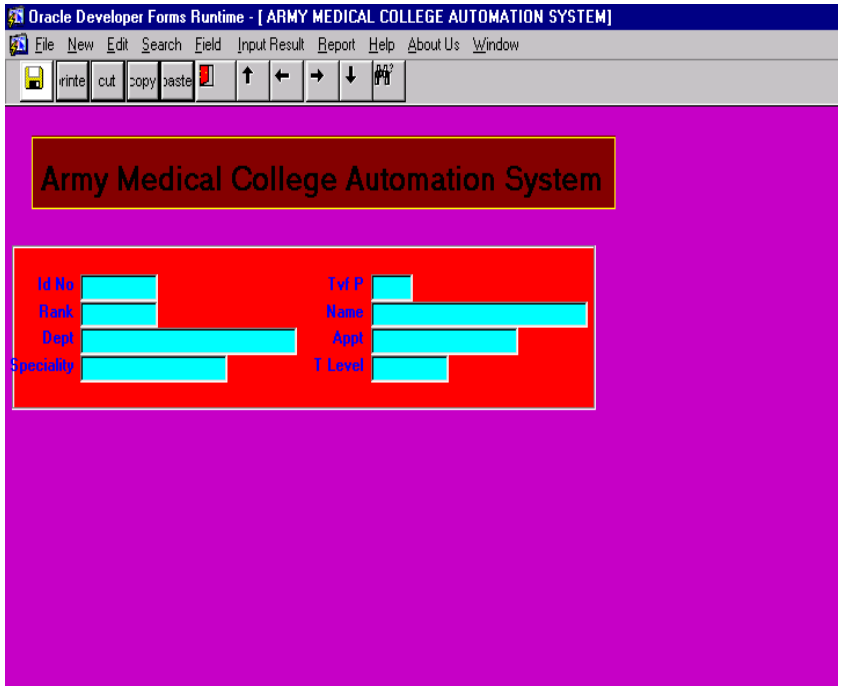
4.15.2 Course Input Form



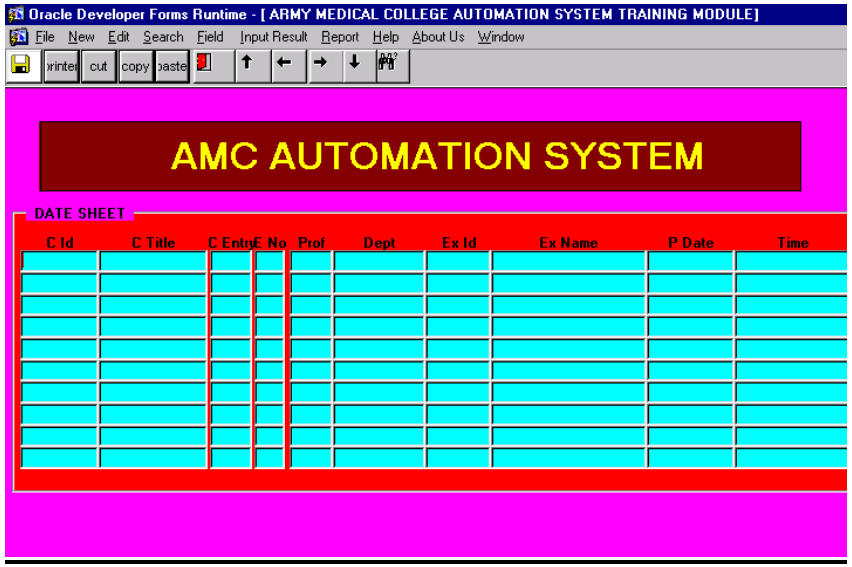
4.15.3 Examiner Input Screen



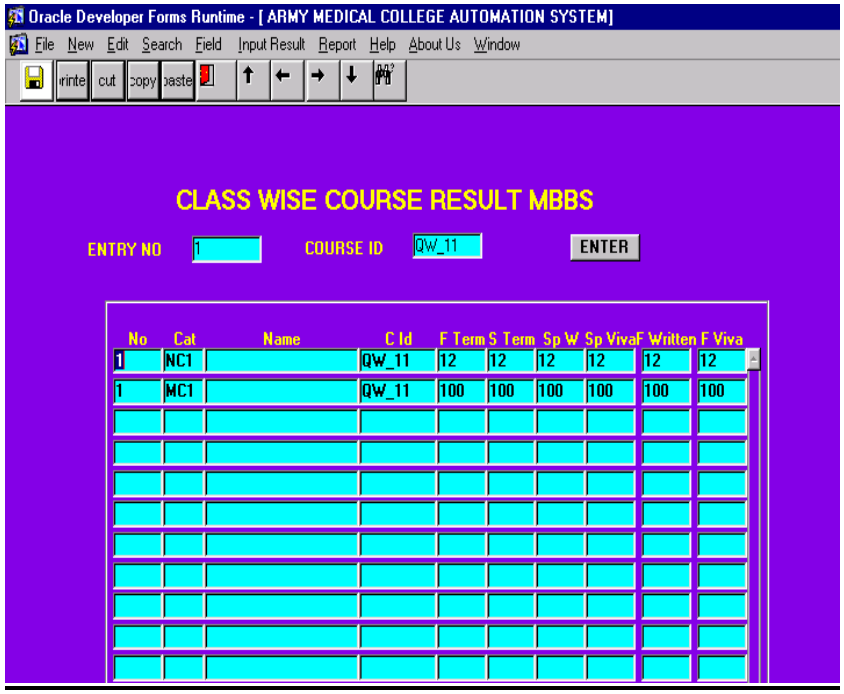
4.15.4 Faculty Input Screen



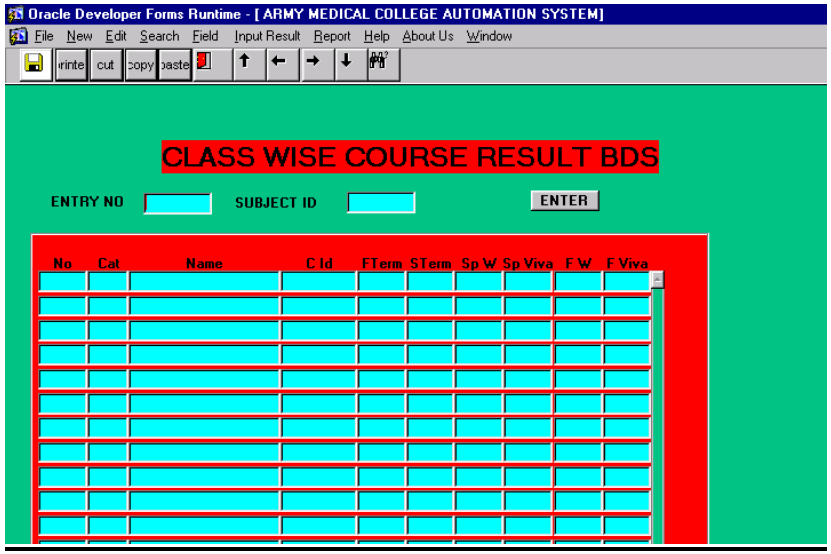
4.15.5 Date Sheet Input Form



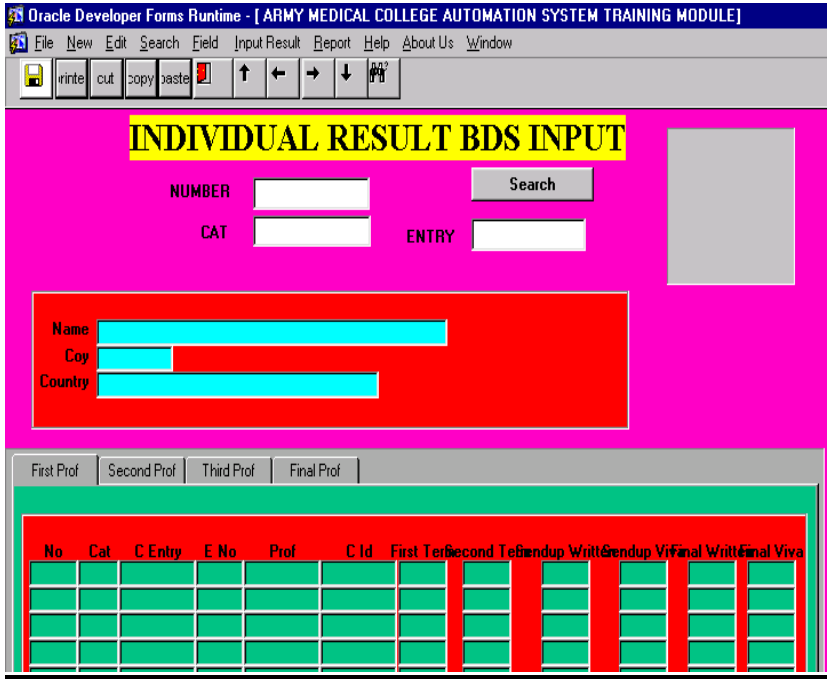
4.15.6 Class Wise MBBS Result Entry



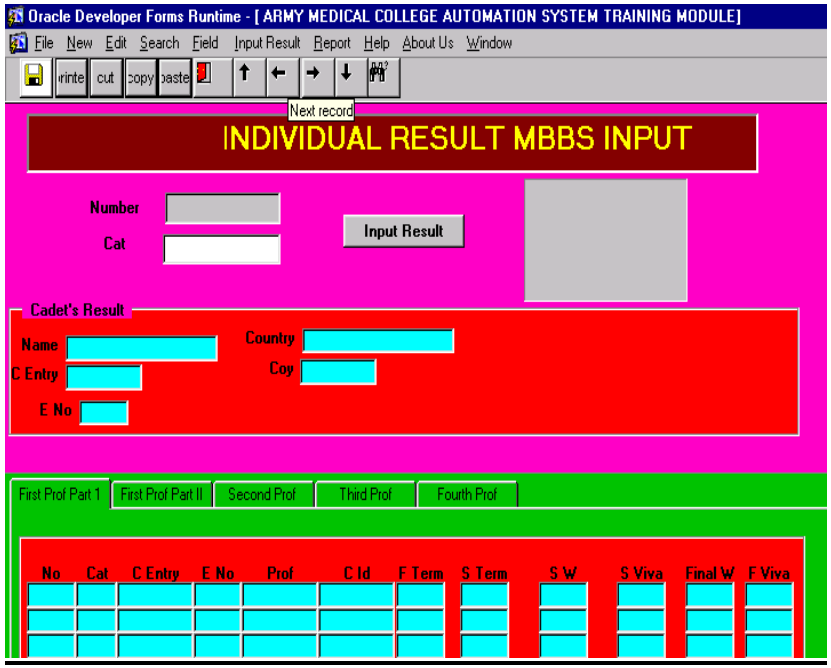
4.15.7 Class Wise BDS Result Entry



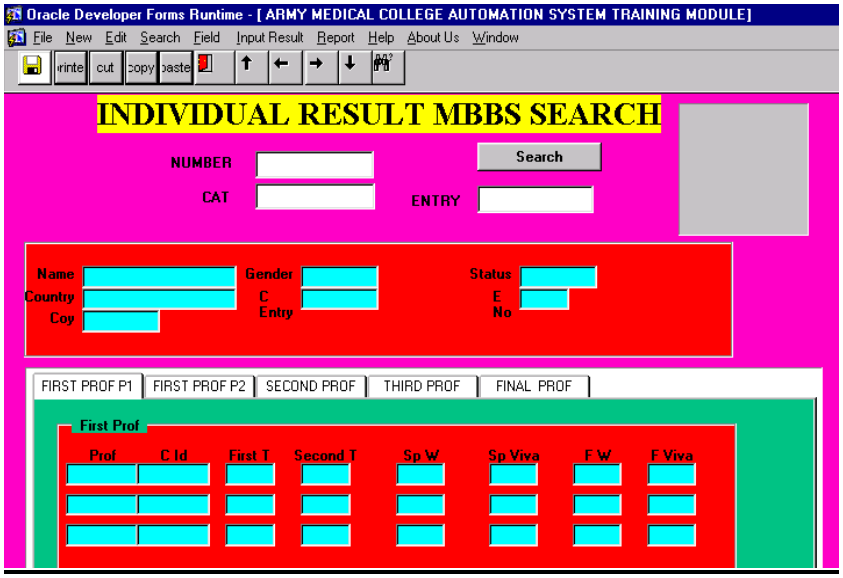
4.15.8 Input Individual's BDS Result



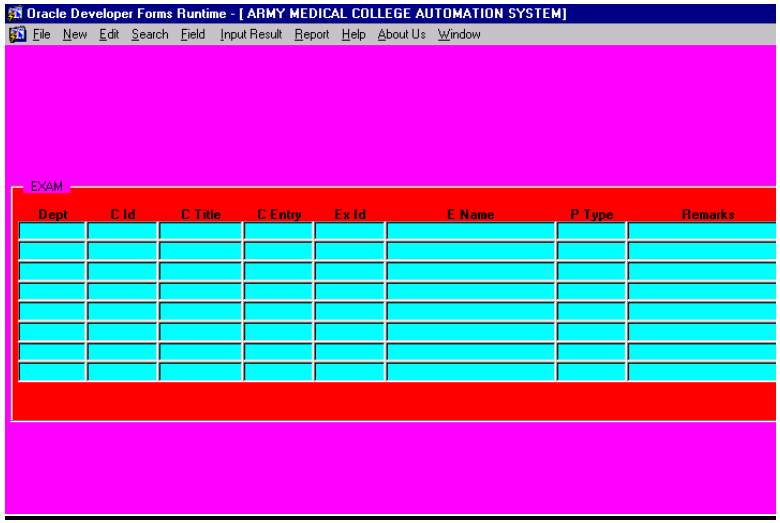
4.15.9 Input Individual's MBBS Result



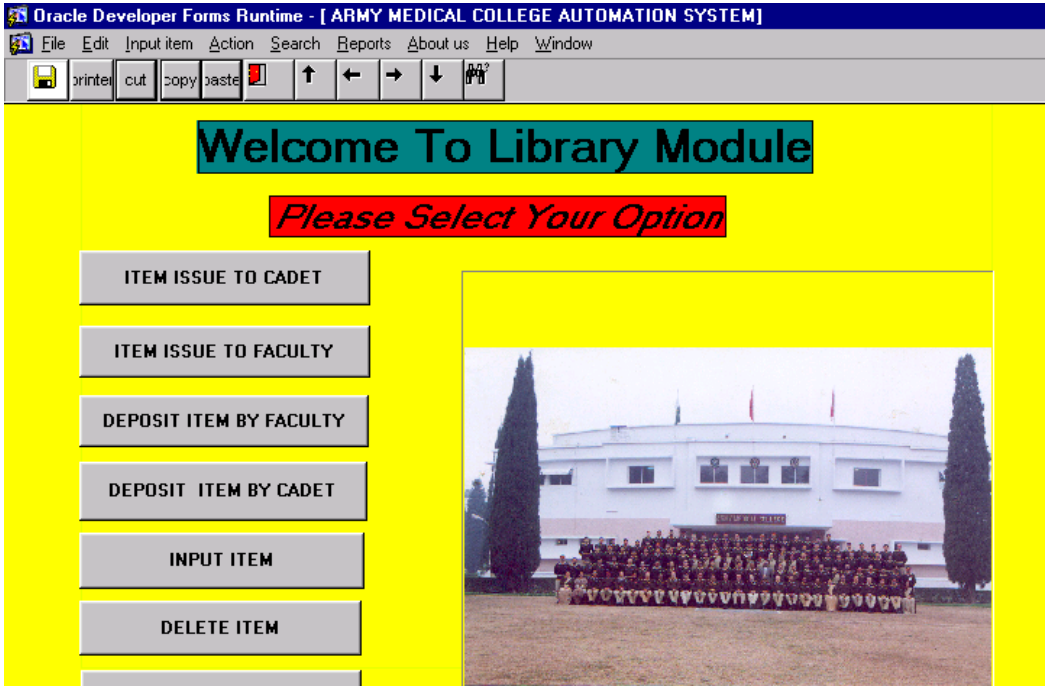
4.15.10 Search For Individual MBBS Result



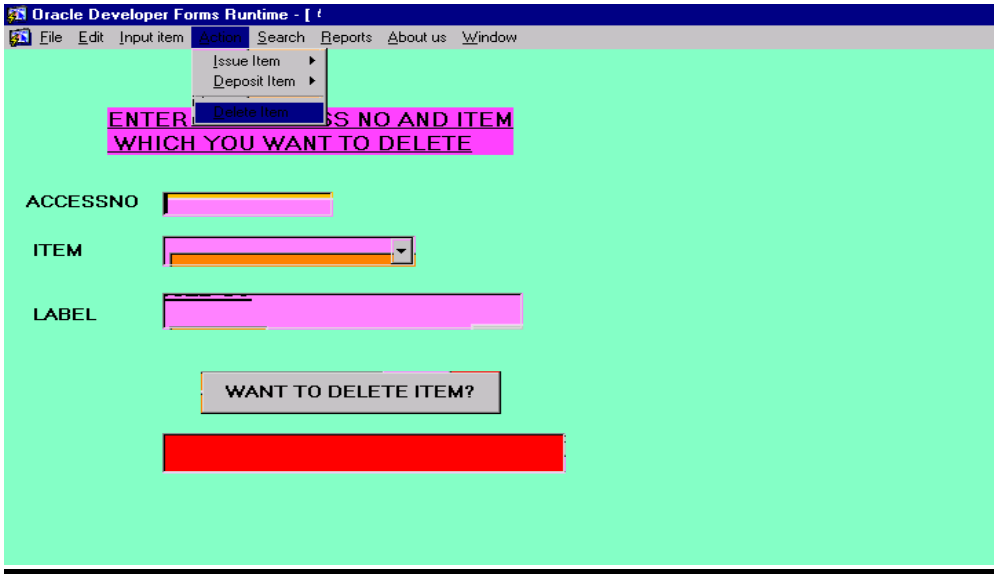
4.15.11 Exam



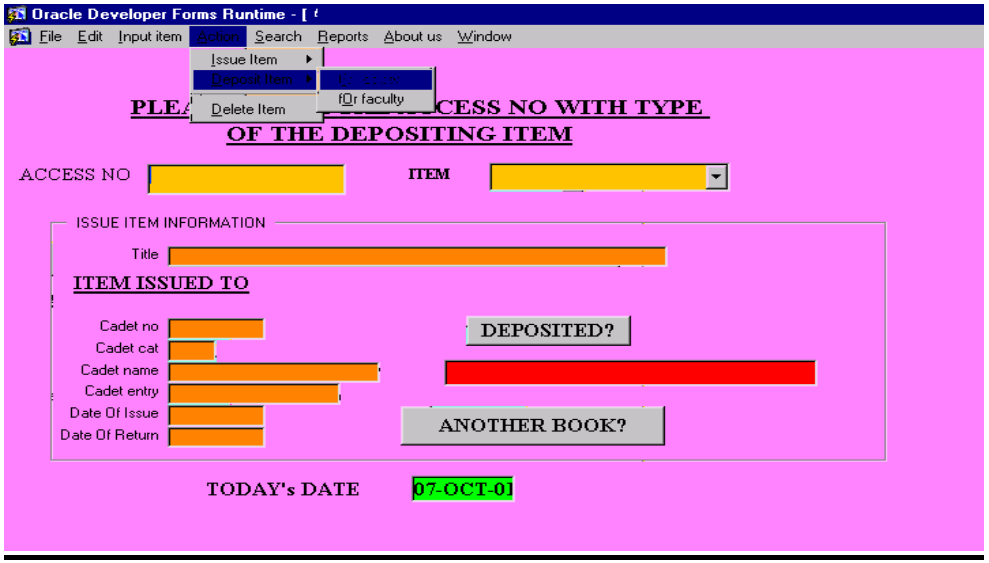
4.16 Library Main Page



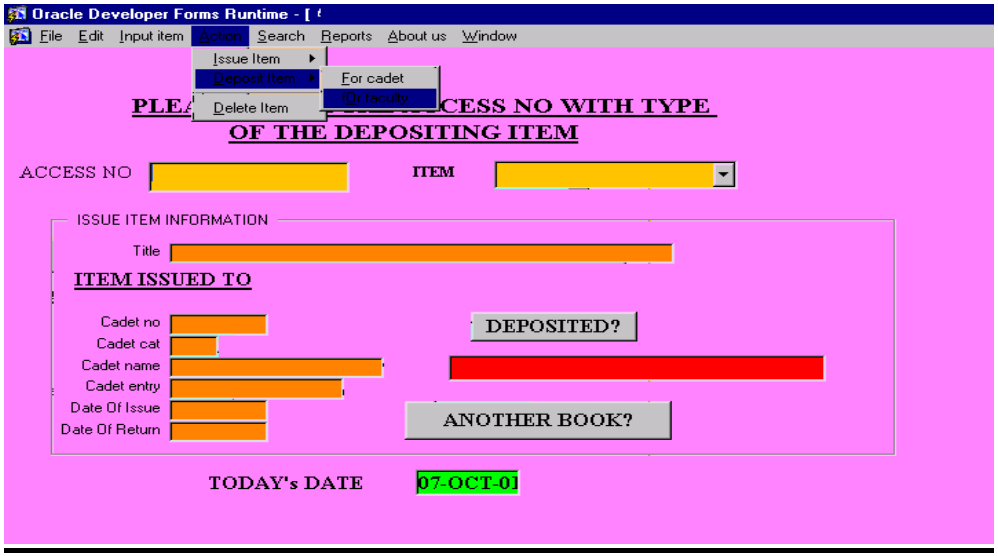
4.16.1 Delete Item Form



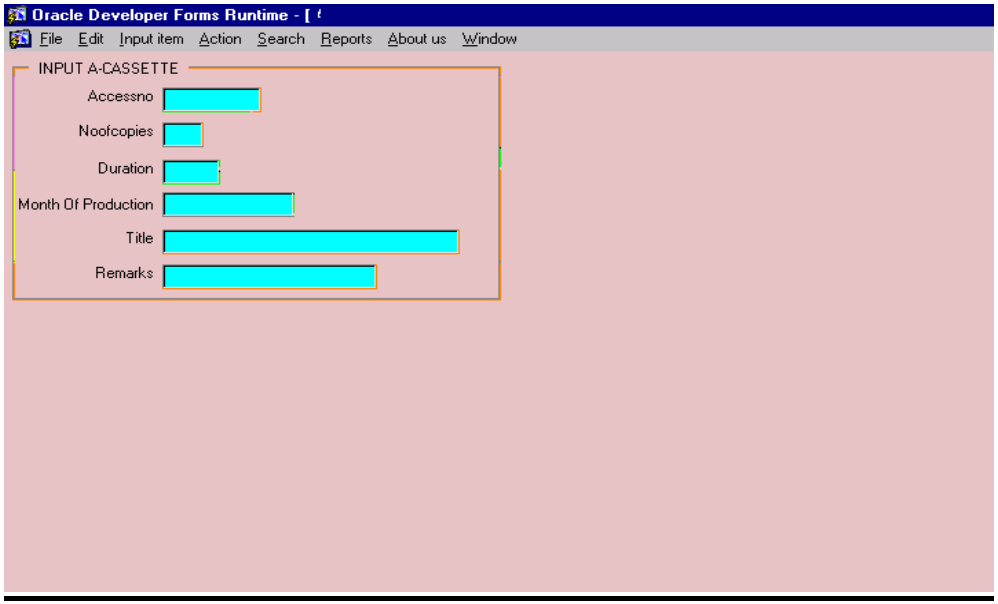
4.16.2 Deposit By Cadet Form



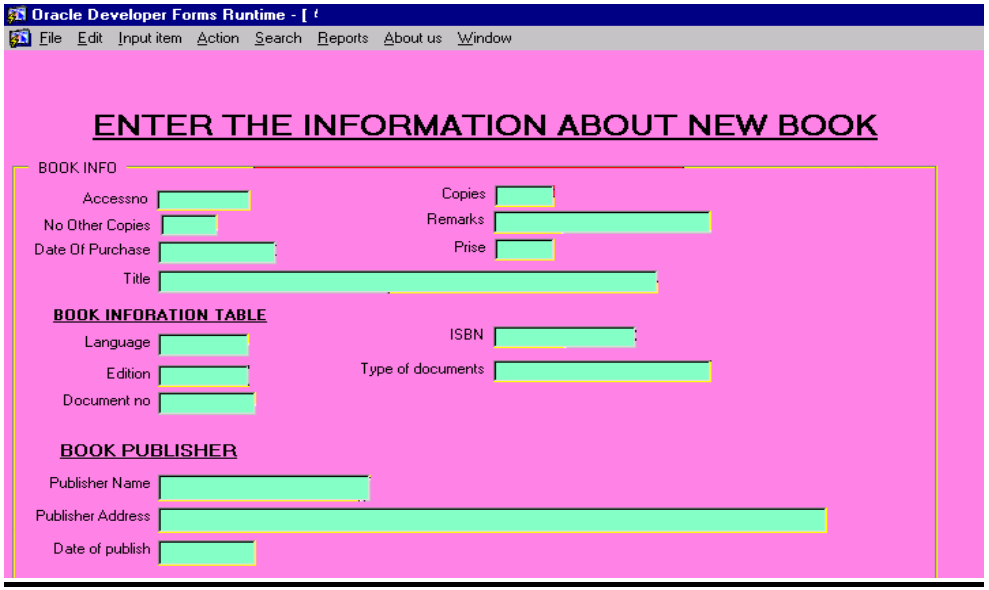
4.16.3 Deposit By Faculty



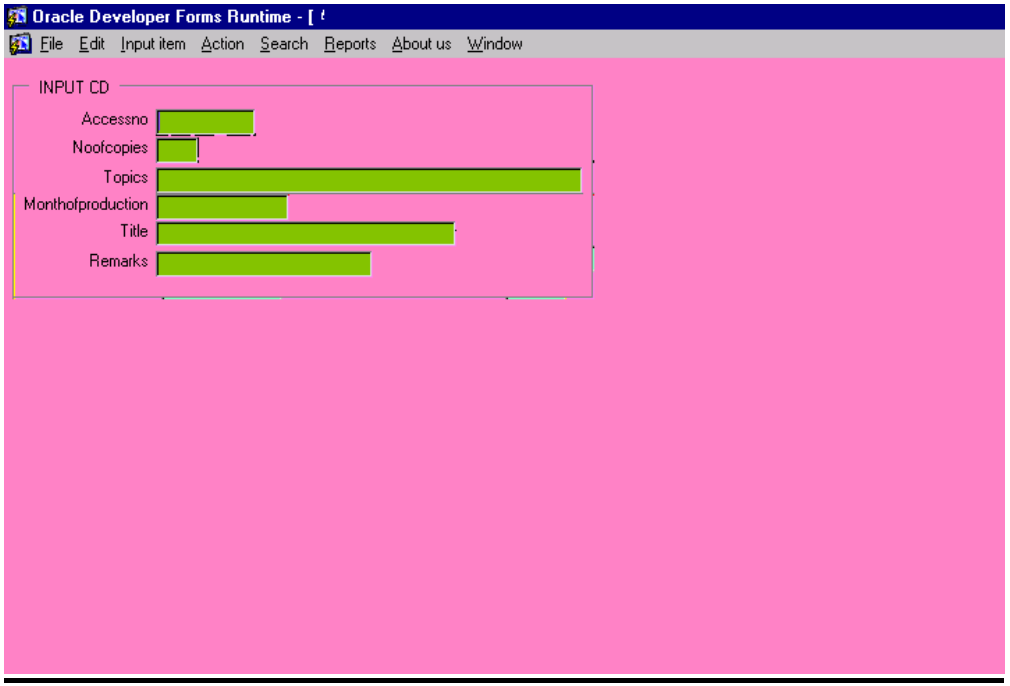
4.16.4 Input Audio Cassette



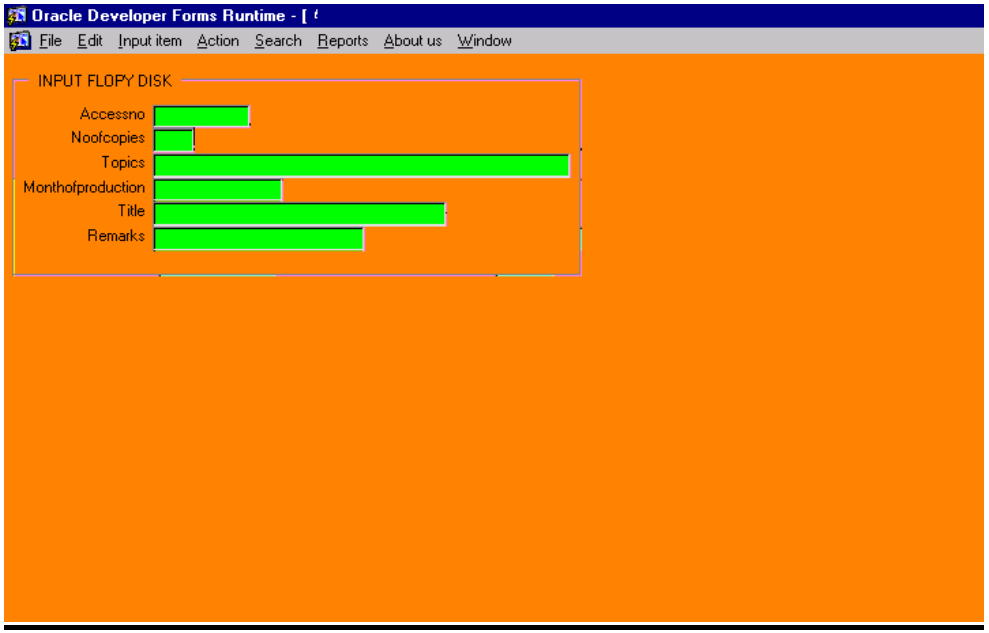
4.16.5 Input Book Form



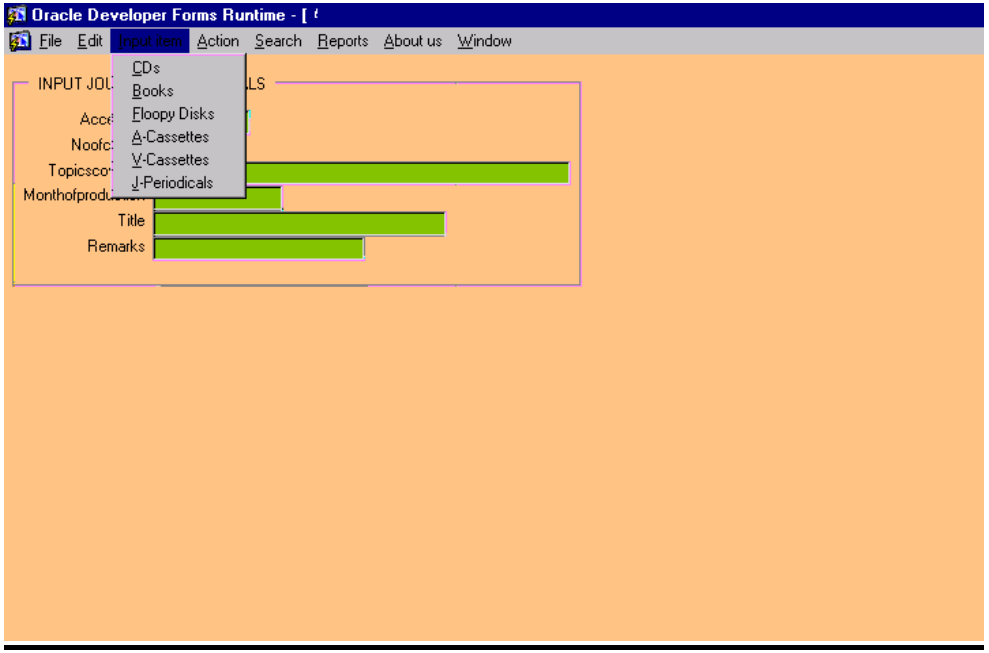
4.16.6 Input CD Form



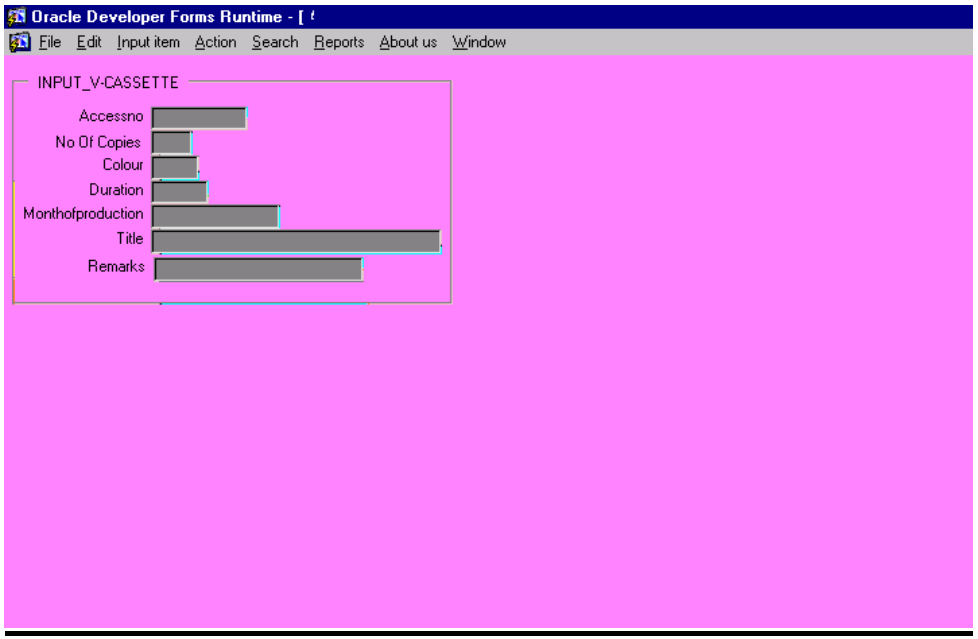
4.16.7 Input Floppy Disk



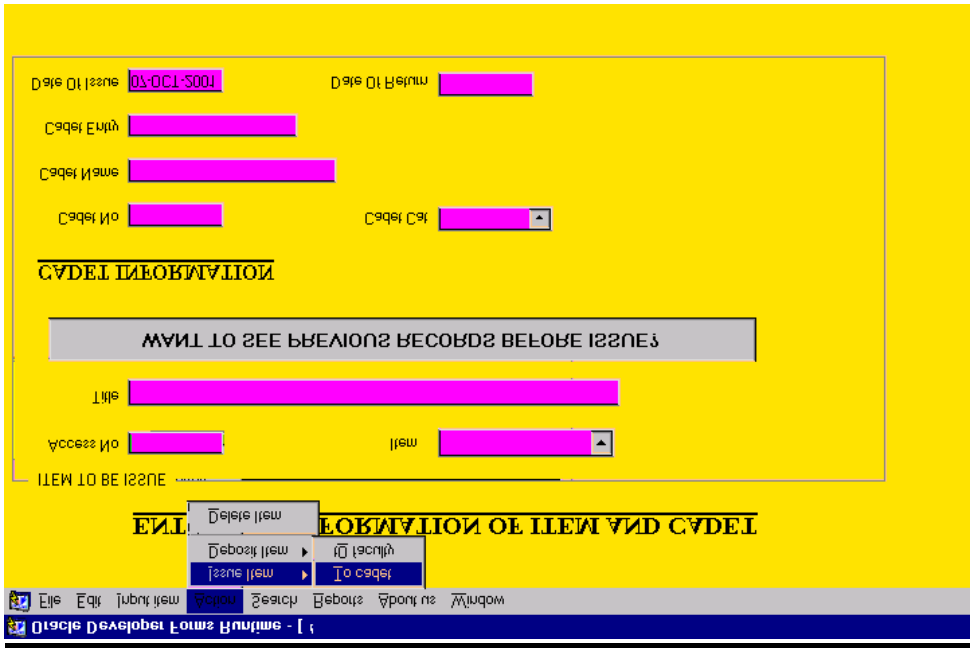
4.16.8 Input Journals/Periodicals



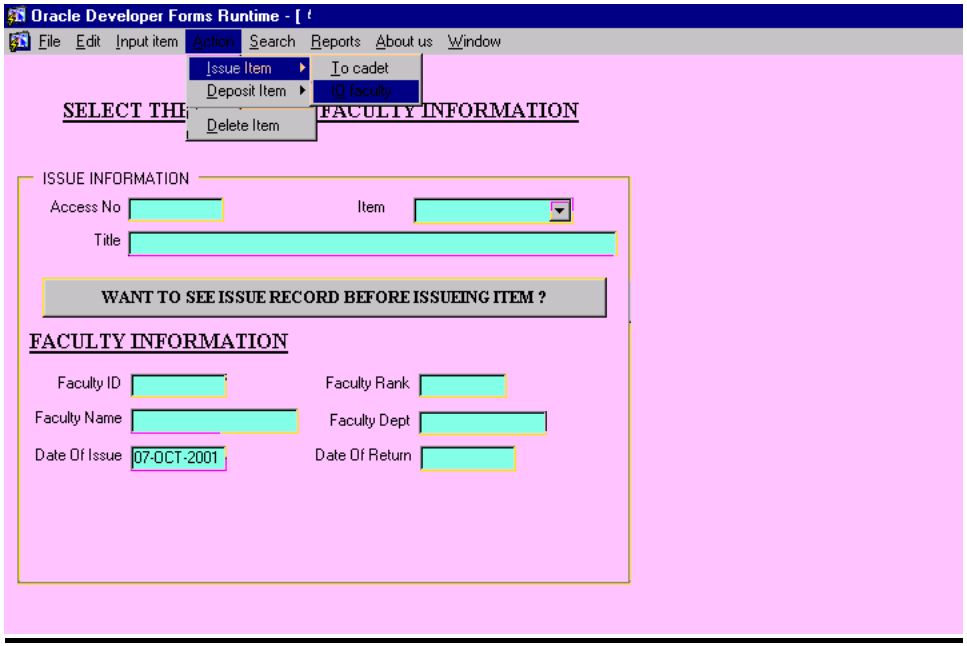
4.16.9 Input Video Cassette Form



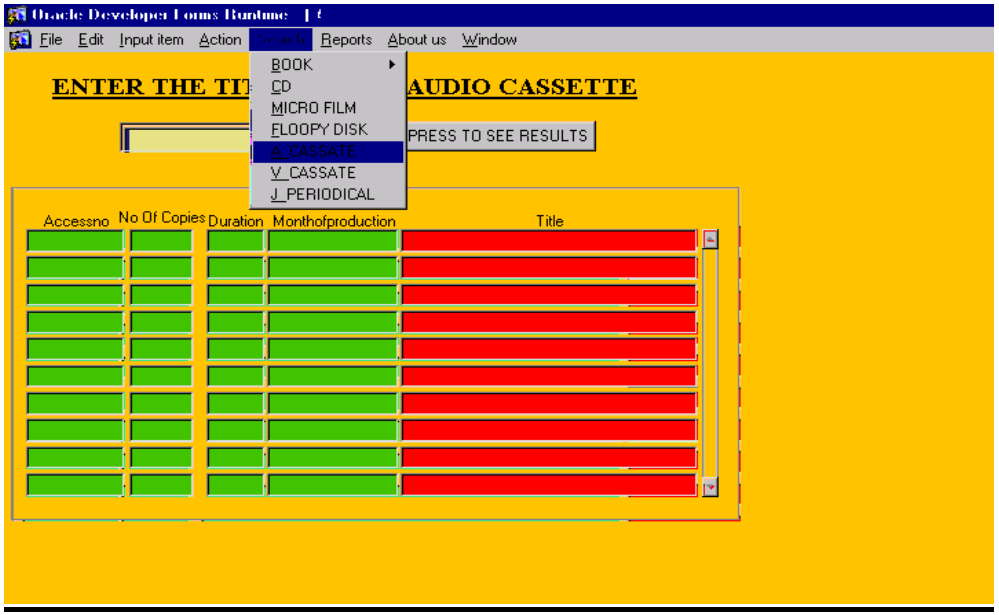
4.16.10 Issue To Cadet Form



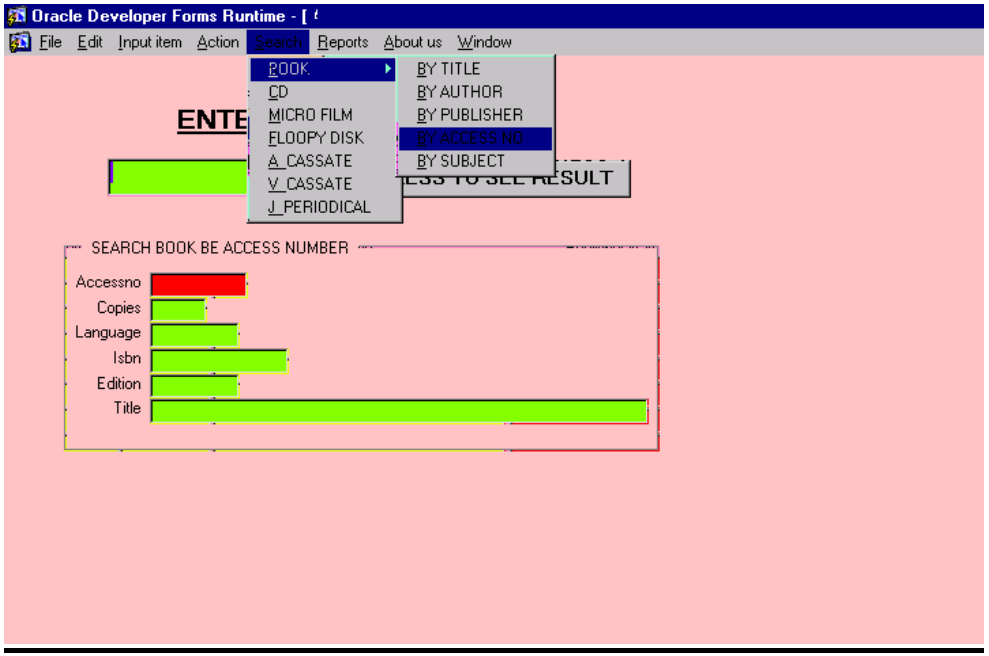
4.16.11 **Issue To Faculty**

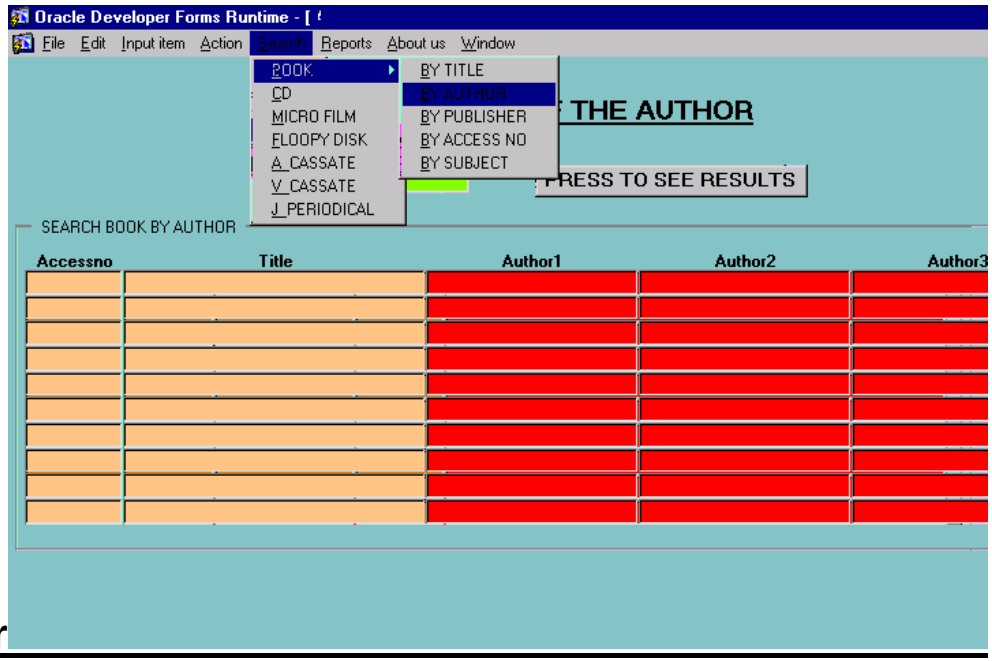


4.16.12 **Search Audio Cassette**



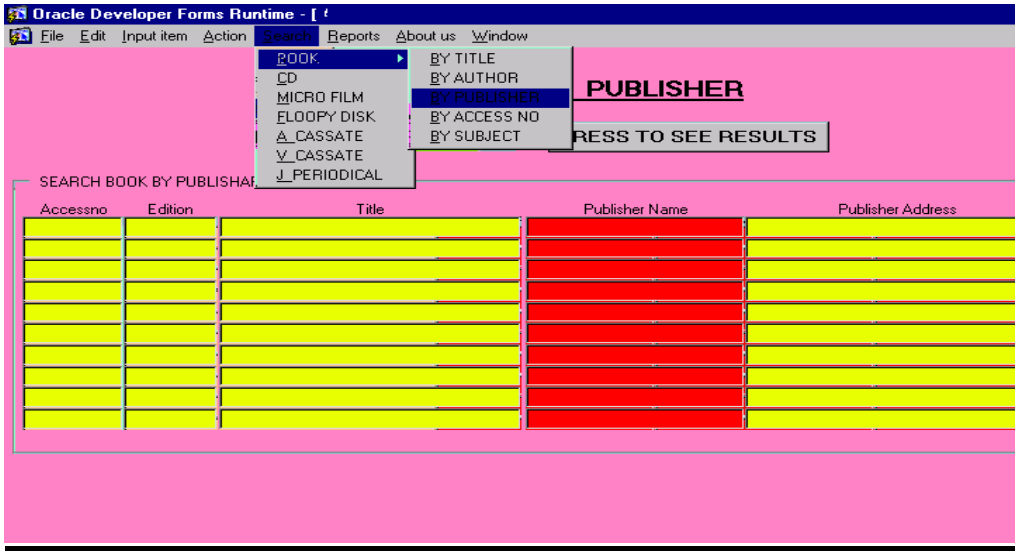
4.16.13 Search Book By Access Number



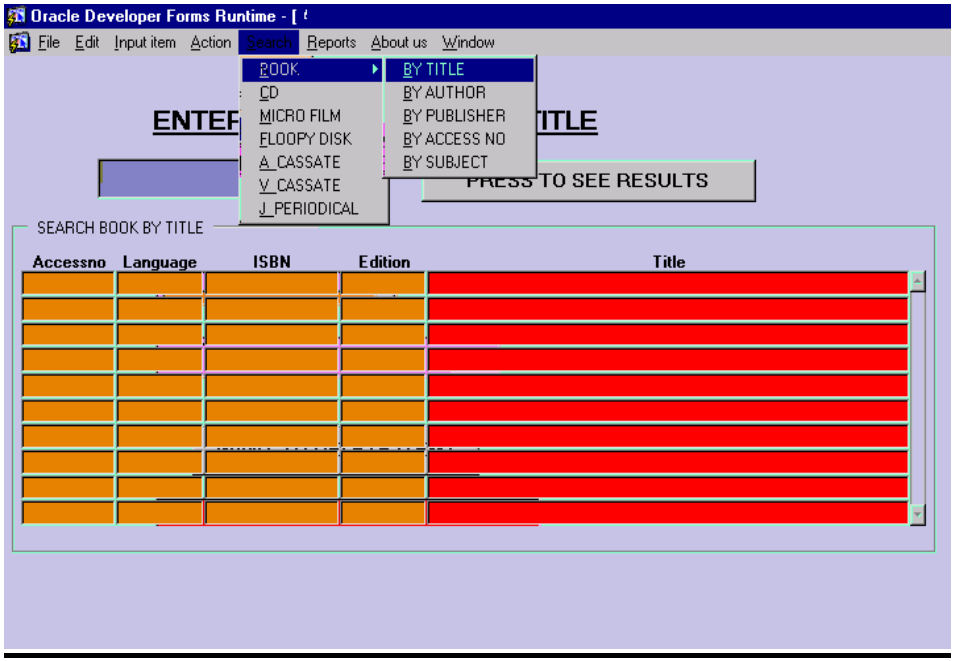


4.16.14 Search Book By Author

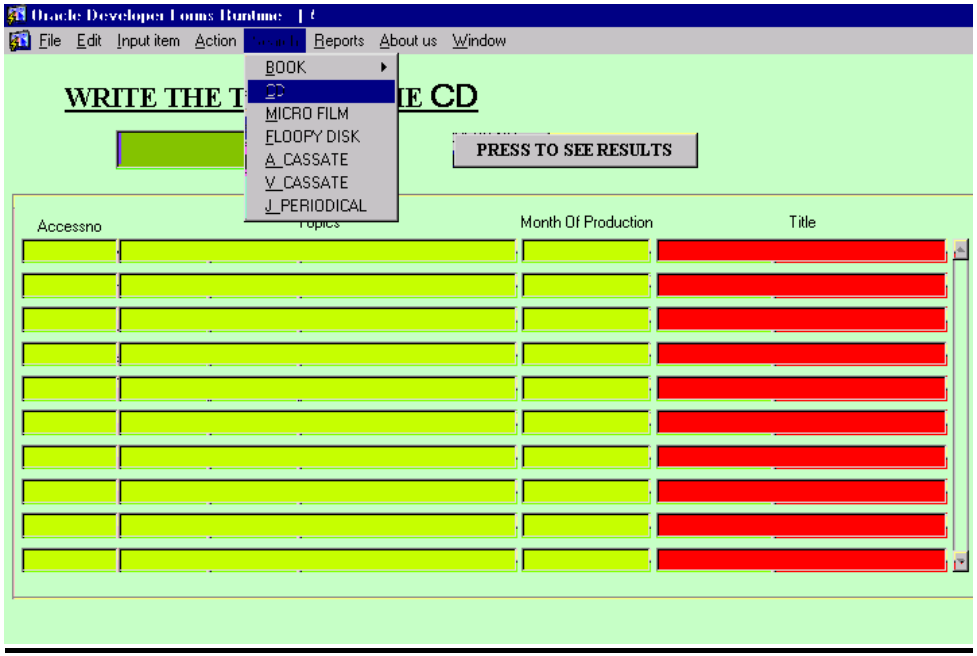
4.16.15 Search Book By Publisher



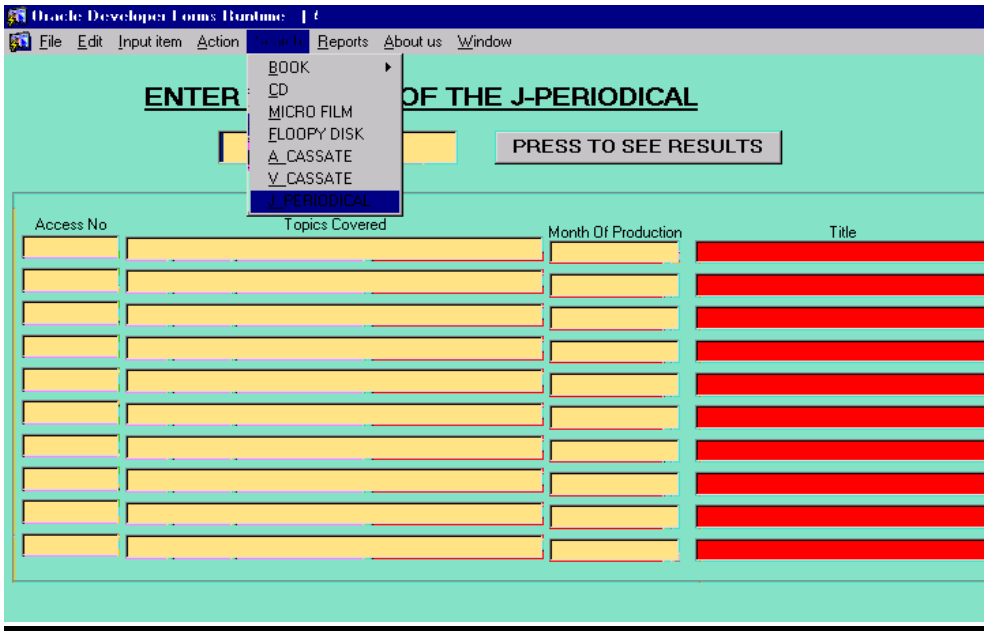
4.16.14 Search Book By Title



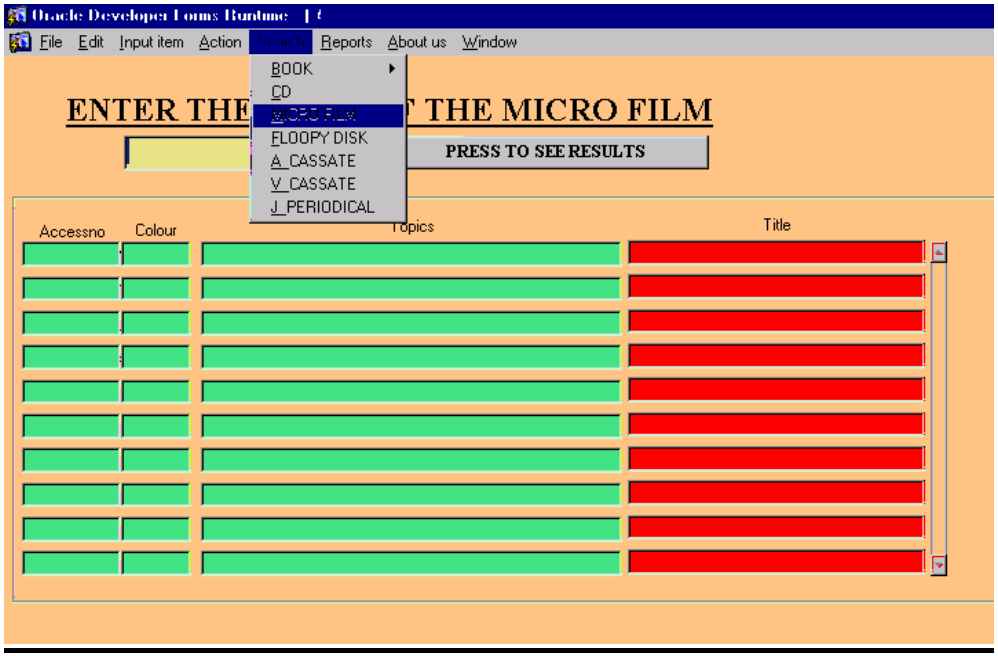
4.16.17 **Search CD**



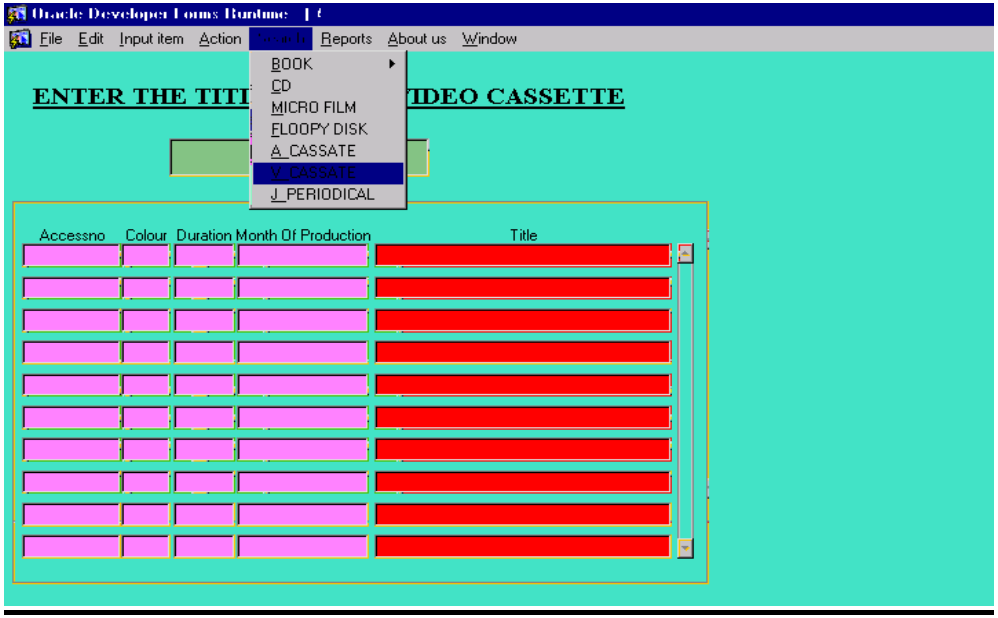
4.16.18 **Search Periodicals/Journals**



4.16.19 **Search Micro Film**



4.16.20 **Search VideoCassette**



4.17 **Reports**

Reports are the out puts of the data entered into the database. Following are the reports generated from the database:

a. Nominal Roll: This describes the general detail of the cadet.

b. Cadet Strength: This give detail cadet strength company wise/ category wise/ course wise.

c. Cadet In/Out Living: This contains details about cadet in or out living record.

d. Foreign Cadet: This will contain details about the foreign cadet.

e. Serving Parents: This will have record of all cadets whose parents are serving in the armed forces.

f. Wdr: This contains details about all cadets who have been withdrawn from college.

g. Relegation: This give details about the relegation cases.

h. Indl Result: This contains details about individuals result semester wise/part wise/prof wise.

i. Subject wise: This contains subject wise result of entry.

j. Class wise: This contains class wise result.

k. Prof wise: This contains prof wise result.

l. Date Sheet: This report will generate date sheet semester wise/part wise/ prof wise.

m. Internal Evaluation: This will generate an calculated, Internal Evaluation report.

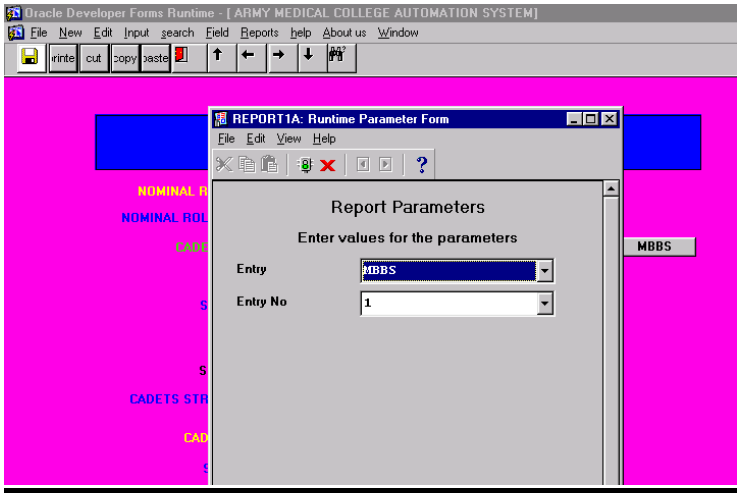
n. Outstanding Books Cadets: This will generate all outstanding books against any cadet.

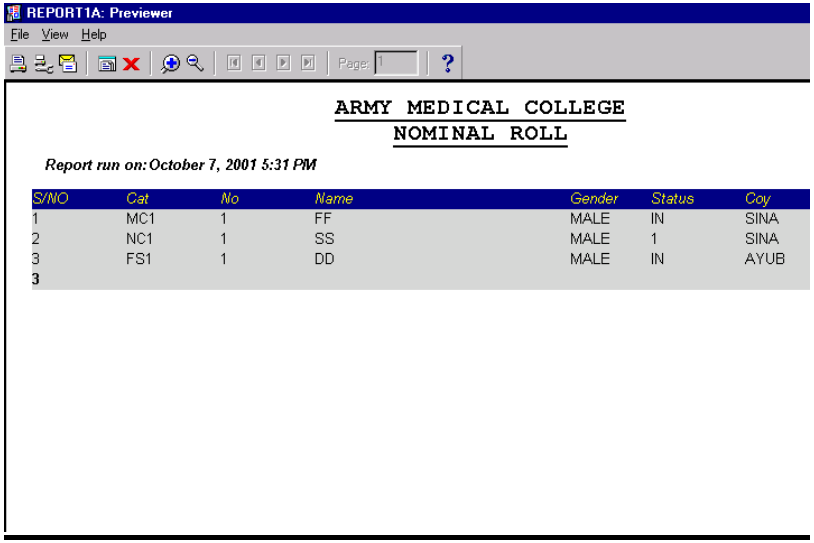
o. Outstanding Books Faculty: This will generate all outstanding books against any Faculty member.

p. New Purchase Books: This will generate all newly purchased books for the library along with their price.

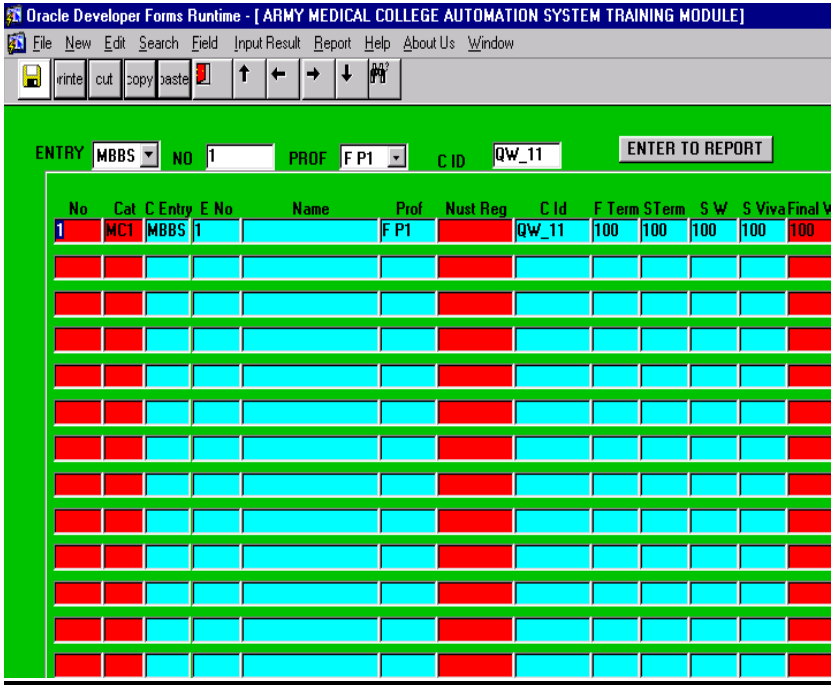
Just just pressing the required button can generate these reports. The format of these reports is also attached.

4.17.1 NOMINAL ROLL

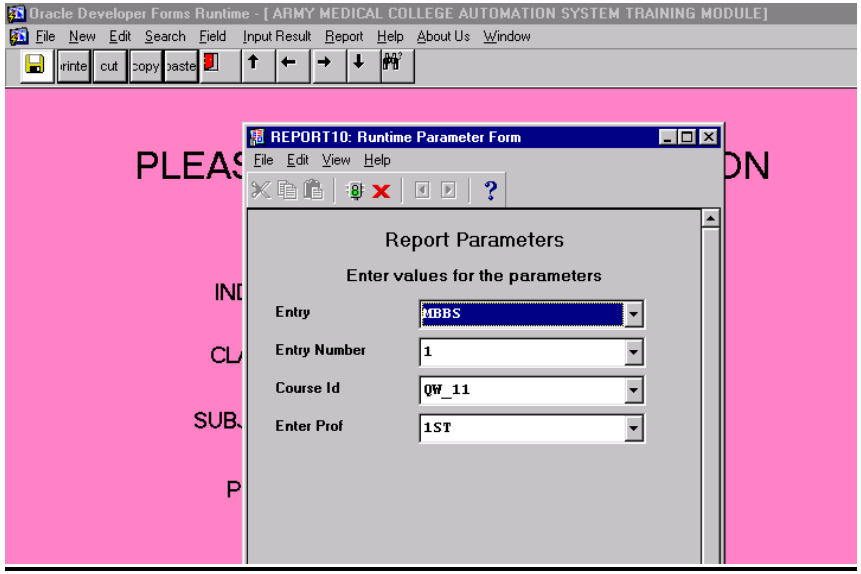


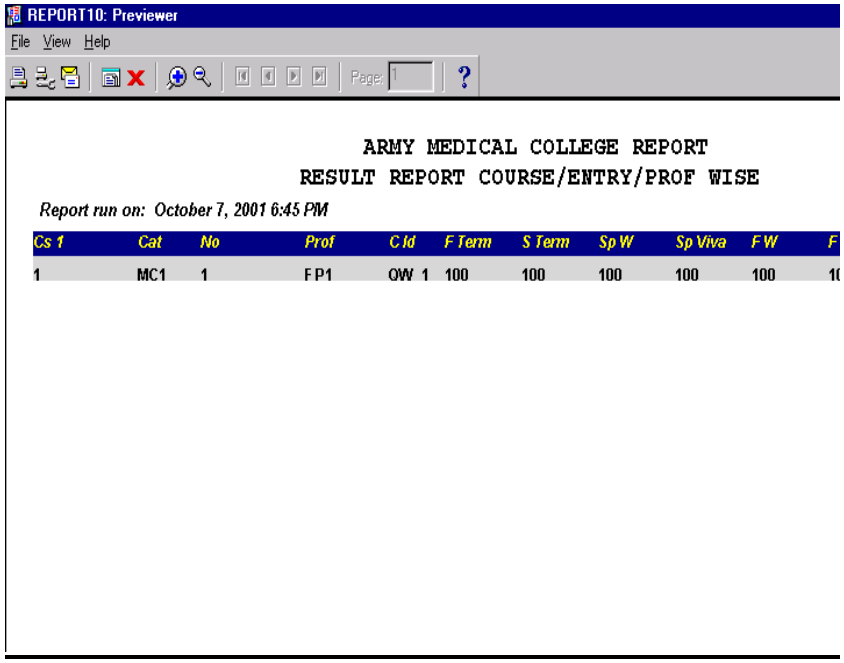


4.17.2 Class Wise Result Output

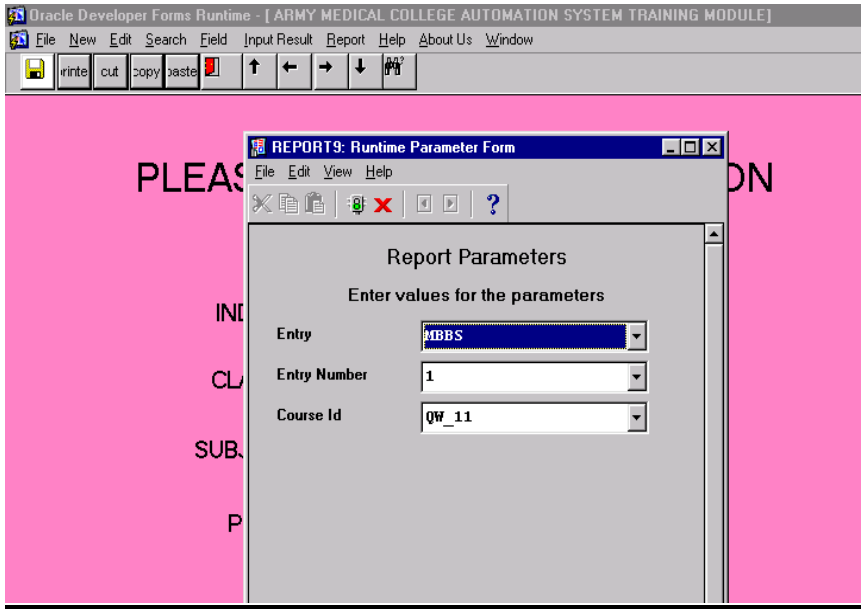


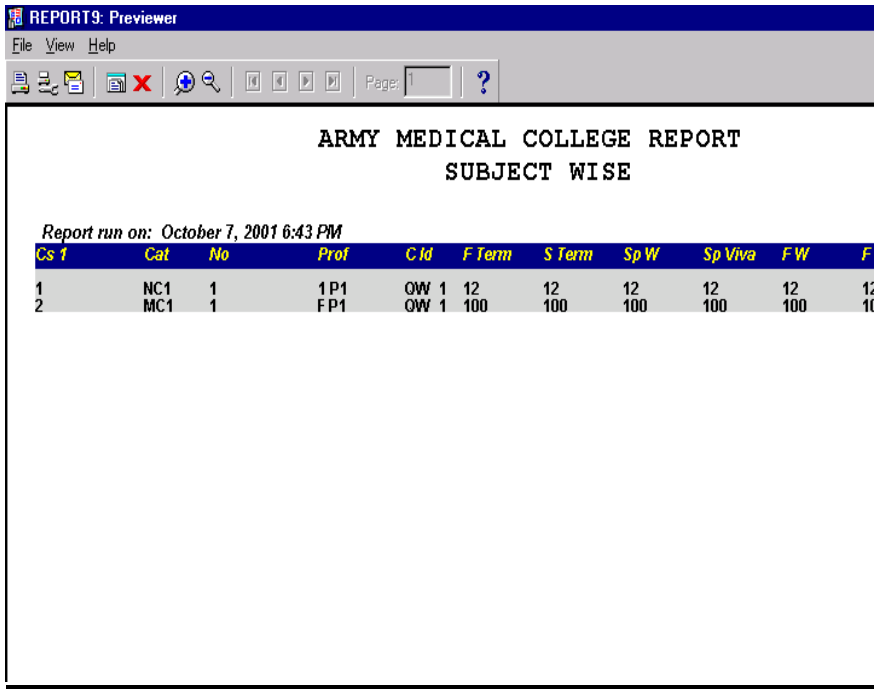
4.17.3 **Prof Wise Report**



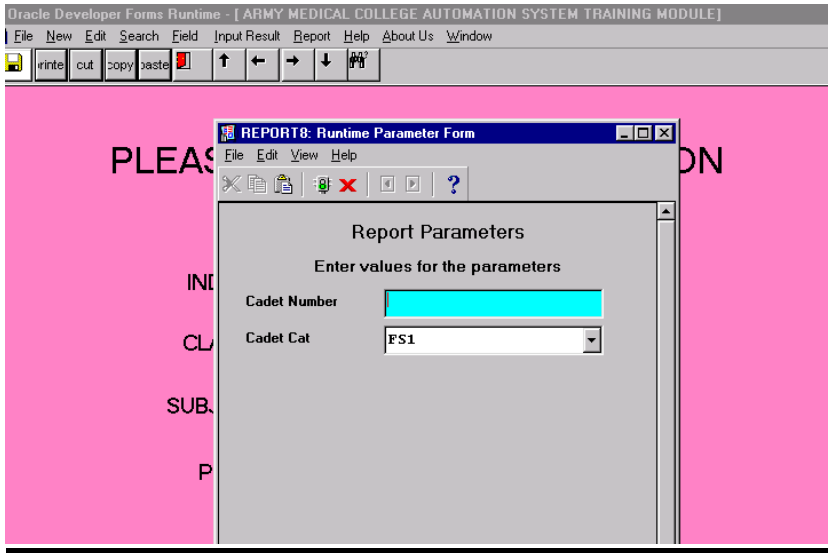


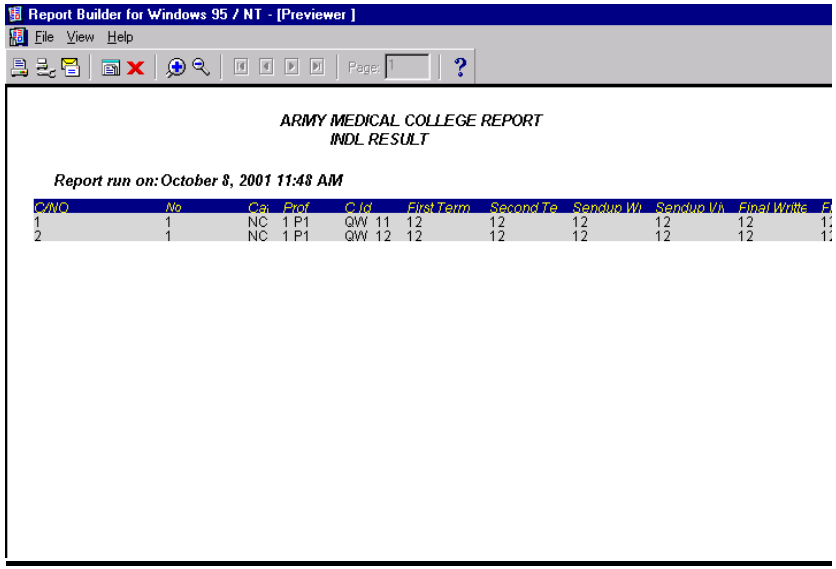
4.17.4 **Subject Wise Result**

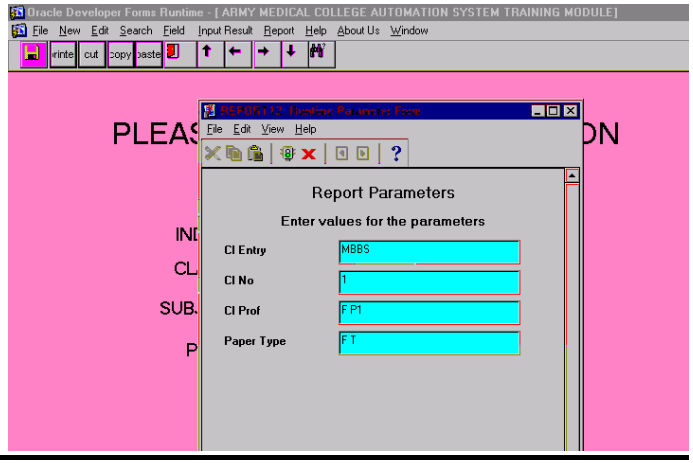




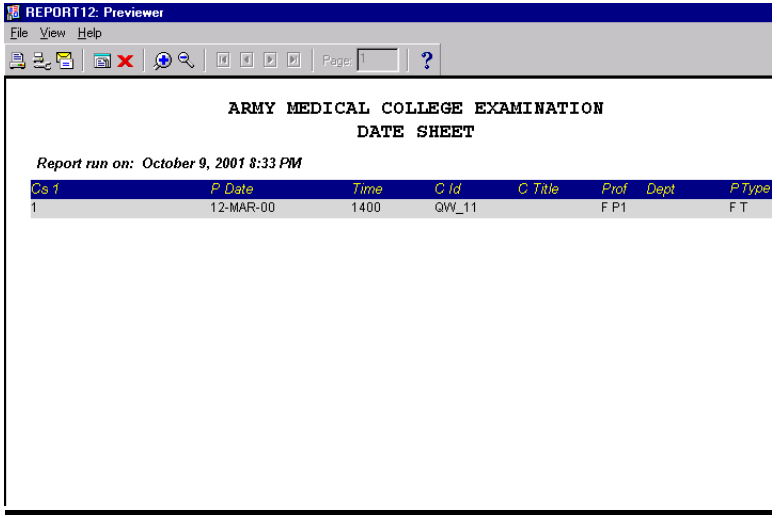
4.17.5 **Individual Result**



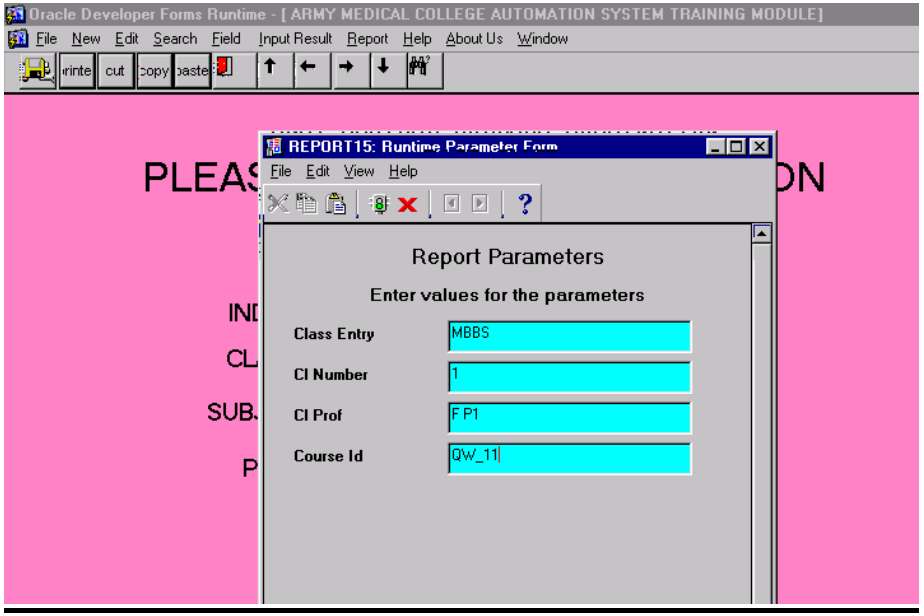




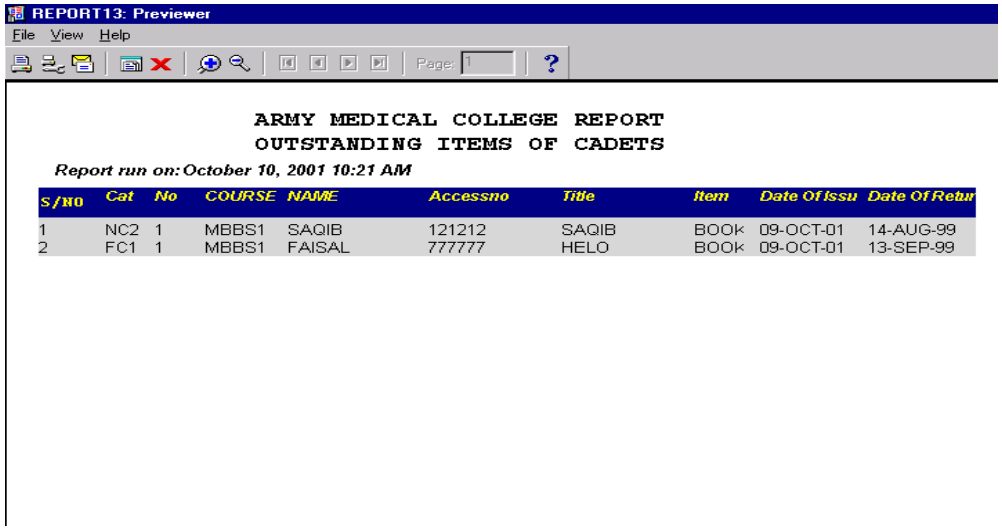
4.17.6 **DateSheet**



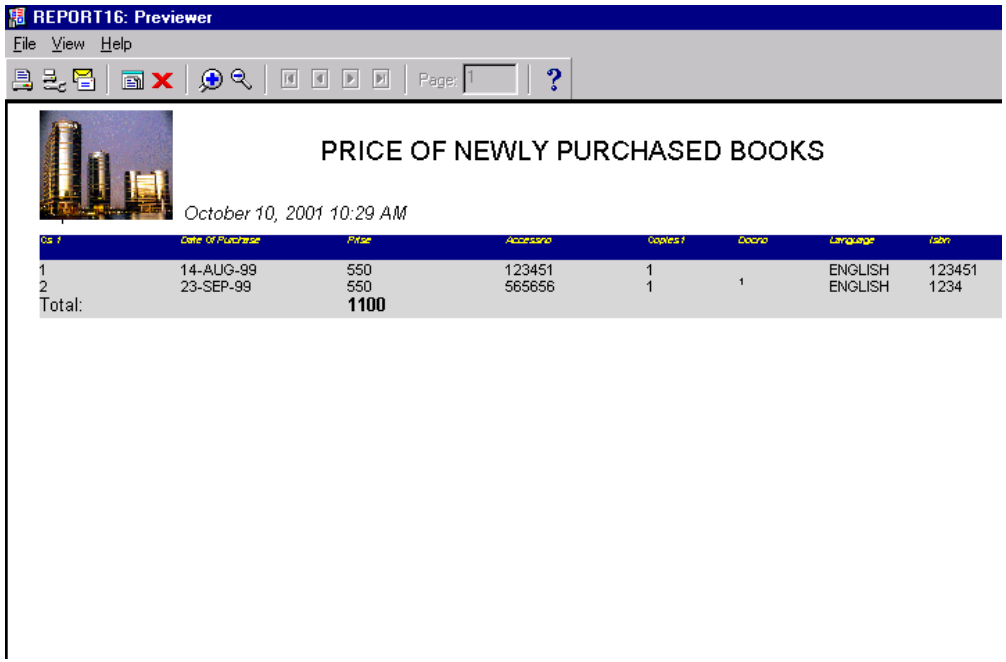
4.17.7 **Internal Evaluation**



4.17.8 OUTSTANDING ITEMS OF CADET



4.17.9 NEWLY PURCHASED BOOKS WITH TOTAL PRICE



CHAPTER NO 5

OBJECTIVES, ACHIEVEMENTS AND FUTURE WORK

5.1 Project Objectives

The computer-based system should be designed keeping in view the objectives. So, it is essential and helpful to establish the objectives that the system should satisfy. In addition the relative importance of each objective should also be established. In this system, following factors and objectives were kept in mind: -

a. Different reports about cadet's strength, result, library material should be available at right time, so that the time and the effort the organization can be saved.

b. The conversion of manual based system to a computerized system.

c. To remove most of the inefficiencies, bottlenecks of the existing manual system.

d. To make the system simple and easy to use.

e. Implementations of attractive user interface, providing security features and access rights/privileges.

f. To make sure that access of data should be quick.

g. To make the environment user friendly, so that user can easily understand the data entry and report generation procedure.

5.2 ACHIEVEMENTS

The current implementation of AMC database provides the following features: -

a. The system generates computerized report of all the wings and thus can generate requirements for the adm wing.

b. The database is capable of storing complete record thus making system more efficient and accurate.

c. The working of the college will be efficient in terms of response to various queries made by different organization.

d. A lot of time spent on making, processing and maintaining the reports (time and again) can be saved with this system, because statistics would be available at run time.

e. The reports and returns would be efficient with this system.

f. The cadets who get relegated there entry number can be easily changed. Similar is the case for withdrawals.

j. The result of cadet can be checked at any time.

5.3 FUTURE WORK

The present era indicates vast advancement in the field of information technology. A number of future enhancements that can be made in this project are: -

5.3.1 Distributed Database

Currently system is based centralized Database system using client /server model. The whole data is stored on one server and the clients access it. Once the data storage becomes very large and number and the respective wings also swell considerably then, ideally data should be distributed onto various mutually communicating servers/nodes. These nodes will have their own clients, capable of accessing any data from any node on the network.

5.3.2 Real Time Availability of Data

The Wings and their department are scattered all over Rawalpindi. Current model envisages data being supplied by these departments through manual means. To ensure timely processing / availability of data all these departments/ wings should be

connected on the LAN minimum. Then the current system can also be tailored to be web based, where inputs can be submitted directly to the server using Internet.

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3. Catherine M Ricardo,'Database Architecture', Database Systems,1990 (pp 134- 140).

4 ORACLE,'INTRODUCTION', Introduction to Oracle: SQL and PL/SQL, September 1998, (pp 222 – 256).

5. Catherine M Ricardo,'Normalization', Database Systems,1990,(pp 222- 256).

6 Thomas M. Carolyn E.Begg Anne D Strachan, 'Database Planning, Design and Administration', Database Syatems,1996 (pp 77-84).

7. ORACLE Mannuals for Designing of Database. ————