

COMPUTERIZATION OF THE EXAMINATION SECTION OF THE VJTI MAIN OFFICE

1. Introduction

1.1. The problem and its statement in detail

The aim of the project is to analyze the Examination Section within the VJTI Main Office and to design an automated system to improve the same. The first task towards this goal involved a thorough understanding of the existing system, in order to accurately project the system requirements. For this purpose, Structured System Analysis and Design theory was employed in order to streamline the entire task and to possibly avoid errors in understanding the existing system.

Initially, preliminary investigations were undertaken as follows:

a. Request Clarification

The current system of operation was thoroughly scanned by talking to and interviewing the employees and examining the method of operation. The exact request was properly understood in order to ensure that the system would ultimately satisfy the necessity.

b. Feasibility Study

The task of determining whether the system requested is feasible or not, was next considered. We considered three aspects of feasibility:

i. Technical Feasibility

Currently, the Examinations Section does not utilize computers except for clerical purposes. The work performed by the examination section can be summarized as follows:

- Maintaining a master ledger in order to ensure that every student who is appearing for an exam is eligible to do so.
- To allot exam seat numbers and exam halls to students.
- To maintain a file of student seat numbers and subjects
- To verify the number of papers received from the exam supervisors.
- To appoint internal and external examiners and to store the answer sheets and dispatch them to professors for correction.
- To collect the corrected answer sheets, compile the results and allot grace marks as required.
- To generate the results and issue marksheets
- To take care of the payment of bills to the examiners for paper correction.

It was concluded that the maintenance of records would be greatly facilitated if computers were inducted into the system. So it is definitely technically feasible to computerize the Exam Section

ii) Economic Feasibility

Time is a major problem in the current system. Due the requirement of manual entries, the results are often delayed. This causes an imbalance in the entire examination system. Moreover, there are chances of errors creeping in due to manual data entry. If computers were introduced, there would be no such imbalances or errors. It was verified that the college has enough funds to sustain the implementation of the system after it is designed.

iii) Operational Feasibility

Due to a possible lack of computer skills among the employees, there is a requirement to impart extensive training to the personnel in order that they handle the transition to an automated system, gracefully.

Once the above is done, it is felt that the automation of the system is definitely operationally feasible.

c. Request Approval

Once the preliminary investigations are completed, the analysis was submitted to the project guide for approval. Changes suggested by the guide were taken into consideration and the process was repeated. Once the analysis is approved, its priority, completion time and personnel requirements will be estimated and finally the project can be scheduled to launch.

1.2. The existing manual system

The present system functions as follows:

1) **Admission**: When a student is admitted to the institute his record is inserted into the master ledger. Master ledger is a file, which contains record of all the students of the institute. Each record of the student has the following format:

- i) Roll number
- ii) Name of the student
- iii) Name and address of Father/Guardian
- iv) Age, date of birth
- v) Previous college and university attended
- vi) Last exam passed
- vii) Place of permanent residence
- viii) Date of admission
- ix) Category (blind, etc.)
- x) Class of year to which admitted
- xi) Results for individual semesters(semester I,II,III,...,VIII)
- xii) Transference certificate (if any)
- xiii) Date of leaving
- xiv) Reason of leaving
- xv) Remarks

In this record we also specify direct admission of student to semesters III, V or VII

Updating of master ledger:

After any semester results are out, the master ledger is updated. The result of the student is reflected in his/her record in the master ledger.

2) **Eligibility criteria:**

Following are the eligibility criteria for taking any semester exams:

- i. For odd semesters (III, V, VII) a maximum of four A.T.K.T's in the latest two semesters are permissible.
- ii. For even semesters (IV, VI, VII) a maximum of six A.T.K.T's in the latest two semesters are permissible.

Only students who satisfy the above mentioned criteria are allowed to appear for the examinations. In case a student wishes to appear for the VII semester again to improve his grades, he can appear for theory and practicals only, the rest being carried over.

The allotment of the examination number is carried out after the eligible students pay the examination fees.

3) **Supervisors report:**

On the day of the examinations the supervisor submits the attendance record of the students. This is known as 'Supervisor's Report'. Its format is attached alongwith.

This report is verified by the office staff and is stored for future reference.

4) **Appointment of Examiners:**

A table containing records of the internal and external examiners is maintained. Using this table, the person in charge of the examination section along with the H.O.D, appoints internal and external examiners for that department.

A preformatted letter is sent to the appointed examiners with a provision for declining the appointment. In case the examiner declines the appointment, another examiner is selected as above.

A sample of the preformatted letter sent to the examiner is shown.

5) **Dispatch:**

The following matter is sent to the appointed examiner:

- i) Covering letter
- ii) Answer books
- iii) A blank mark sheet
- iv) Resolution form
- v) Bill

The covering letter specifies subject, semester or course, date, and number of answer books.

The examiner will fill the blank mark sheet and the bill after correction of the answer papers.

A sample of the covering letter, mark sheet, resolution form and bill is attached.

6) **Receiving the mark sheet:**

The examiners return the corrected answer books and the mark sheet. The office staff combines marks of the two sections. After receiving the marks of all the subjects of a semester, processing for grace marks is carried out.

Grace marks are calculated as follows:

- i) For whole semester examination: If the student has 50% or more over all, a maximum of 10 marks are awarded as grace independent of the number of subjects.
- ii) For part semester examination: A maximum of 2 marks grace per head of passing is awarded, but total grace should not exceed 5 marks.

On receiving the marks of all the subjects of a semester, the marks are printed and the master ledger is updated.

1.3. Disadvantages of the existing system and proposals to overcome them

After analyzing the current system we noted the following disadvantages:

- i) Difficulty in updating the master ledger.

The mark sheets bear the examination number of the student whereas the master ledger is arranged as per the roll number of the student. Hence, the process of updating the master ledger is time-consuming and error prone.

In the proposed system, the master ledger as well as the results will be stored in electronic form and will be linked together by a table. Hence the process of updating the master ledger can be automated.

- ii) Manual determination of the eligibility criteria.

The master file record of each student has to be checked manually for eligibility. This makes the process lengthy.

In the proposed system, the whole process can be automated.

- iii) Manual calculation of grace marks

All the calculations for grace marks have to be performed manually for each student.

This can also be automated in the new system.

- iv) No provision for determining the status

Difficulty in determining the status (whether the papers have been sent for correction, or the practical or viva are pending, etc) of a particular semester.

In the proposed system, provision can be made to provide the status. The staff should be able to get information about the pending items of every semester of each branch.

v) No supplementary information on examiner

No information regarding an examiner's past behavior is stored in the current system.

In the proposed system, extra information about the examiner's past record is maintained such as delay in correction, refusing an appointment, etc. This information can be used while appointing an examiner.

vi) No provision for automated reminders

In the current system sometimes the delay in correction of the papers goes unnoticed.

This can be prevented in the proposed system by generating an automatic reminder after a specified number of days.

vii) Delay in results

Due to the various drawbacks mentioned above there is a delay in the declaration of the results.

As the above drawbacks are eliminated in the proposed system the results can be expedited.

2. System Analysis

Requirement analysis

2.1. Fact finding techniques to collect data

2.1.1. Interview

We interviewed the head of Examination Section, and collected data about the functioning of the existing system. After collecting all the necessary information, several questions were raised to clear existing doubts. We have included some of the questions:

1. Explain the format of Master File.
2. Explain the format of letter.
3. Explain the format of database of internal and external examiners.
4. How is the allotment of examiners done?
5. Do you verify the attendance sheet before sending for corrections?
6. Do you maintain a record of which examiners, what subject, what date? If yes, how is it kept?
7. What if an appointed examiner refuses the work?
8. Do you want to send late reminder?
9. Does the examiner return the corrected papers only, or also the list of seat numbers and marks?
10. What are the rules for eligibility of a student to attend each examination?

The answers to these questions were resolved and have been included in the explanation of the existing system.

2.1.2. Record Review

The files maintained by the examination section were examined in order to understand the working of the manual system. The format of all the forms used in the system was analyzed. The forms have been attached in the synopsis.

2.2. Software and hardware requirements

2.2.1. System requirements

The following questions were asked to accurately project the system requirements:

1. What is being done?

The Examination section of VJTI performs the following tasks:

- i) Maintaining academic record of every student.
- ii) Allotment of exam numbers to eligible students.
- iii) Appointment of examiners and distribution of the student answer sheets to examiners.
- iv) Gathers the marks from the examiners and compiles them considering allotment of grace marks.
- v) Displays the results.

2. How is it being done?

This information was collected from the concerned staff members, and the information is documented above.

How frequently is this done?

The above procedure is carried out 2 times a year.

Volume:

The Examination sections need to process results for all the branches and all years, about 2500 students. Each student on an average carries 6 subjects.

How well is it being done?

The examination section needs to process a large volume of results and hence it takes them a lot of time to release the results.

The consequence is that student's land up getting their results very late.

A computer is used in only one phase of the entire process. After the results are compiled manually, it is entered into the computer using Excel, and the printouts are taken.

What is the problem and how serious is this problem?

The disadvantages were described in the previous section.

Underlying cause: Manually processing the entries takes a lot of time and is error-prone due to the large volume of the papers.

2.2.2. Software requirements

- Operating System - Microsoft Windows 98
- Visual Basic Version 6.0
- Microsoft Access 97
- Database Engine - DAO 3.5

2.2.2.1. Features of Microsoft Access 97

Access is a database program. Because of this feature of Access we are using it as the back-end tool for our project. Thus all our tables are made and managed using Access, which is a Relational Database Management System (RDBMS). In a Relational DBMS the data is contained in the database as a set of two-dimensional tables that present the data in rows and columns. It is then possible to build relationships between tables that contain different fields. This facilitates connecting reports that draw data from a number of different tables and thus you can display only the information you need to see.

An Access database can be used to store information. The information stored in the database can also be manipulated. This storing and manipulation is done using objects provided by Access. These objects are listed below:

1) **Tables** :

Tables are the objects in which the data are stored. They consist of rows and columns. The columns represent the various fields of the table. There are two views for working with tables in Access. They are as below:

- **Datasheet View :**

The Datasheet View is used for entering data in a table and for viewing the data that a table contains.

- **Design View :**

The Design View is used to design the layout of a table.

2) Queries :

A query in Access is a way of getting at the information stored in a database: You specify the criteria for the information you want to see and ask Access to retrieve it. Most queries return a datasheet called a *recordset* containing the appropriate information. But one can also use *action queries* to perform actions on data. There are four types of action queries:

- Make-table queries create a new table from data in one or more tables.
- Delete queries delete a group of records from one or more tables.
- Append queries append a group of records from one table to another.
- Update queries update a group of records.

3) Forms :

In Access, forms provide a way to present the information contained in a table or query so that it can be viewed and updated. Forms can also be used to create dialog boxes and *switchboards*, special forms that allow the user to select from a predefined set of actions.

4) Reports :

In Access, reports are used to control the appearance of the data when it is printed. You can choose what information to include in a report, and can also bind a report to either a table or to a query that draws information from several tables.

In the Design view, you can create WYSIWYG reports that present your information effectively. In the design of a report, you can include any tittle, headings, and so on, that you want to appear in each instance of the report. Along with data, reports can include pictures and graphic elements. As well as the design view, reports offer Print Preview and Layout Preview.

Print preview gives an idea of how the report shall look when it is printed. Layout preview is a preview that you can use when working in Design view to get an idea of how the report will look with sample data in it.

5) **Macros** :

A macro is a way of automating routine tasks, so you can have the computer perform them for you as a batch, instead of you doing them each time. Access uses Visual Basic for Applications as the language for its macros. Access's macro builder can be used to choose the actions you want the macro to perform.

6) **Modules** :

Modules are containers for macrocode. Each form or report includes a module to hold any code associated with it, so when you move the form or report from place to place, it takes the code along with it in the module.

DATA TYPES IN ACCESS

Data type	Storage size	Range
Byte	1 byte	0 to 255
Boolean	2 bytes	True or False.
Integer	2 bytes	-32,768 to 32,767.
Long(long integer)	4 bytes	-2,147,483,648 to 2,147,483,647.
Single(single-precision floating-point)	4 bytes	-3.402823E38 to -1.401298E-45 for negative values; 1.401298E-45 to 3.402823E38 for positive values.
Double(double-precision floating-point)	8 bytes	-1.7976931332E308 to -4.9406564247E-324 for negative values; 4.94065641247E-324 to 1.79769316232E308 for positive values.
Currency(scaled integer)	8 bytes	-922,337,203,685,477.5808 to 922,337,203,685,477.5807.
Date	8 bytes	January 1, 100 to December 31, 9999.
Object	4 bytes	Any Object

		reference.
String(variable-length)	10 bytes + string length	0 to approximately 2 billion (approximately 65,400 for Microsoft Windows version 3.1 and earlier).
String(fixed-length)	Length of string	1 to approximately 65,400.
Variant(with numbers)	16 bytes	Any numeric value up to the range of a Double.
Variant(with characters)	22 bytes + string length	Same range as for variable-length String.
User-defined(using Type)	Number required by elements	The range of each element is the same as the range of its data type.

2.2.2.2. Features of Microsoft Visual Basic 6.0

As MS Access and Visual Basic use the same database engine (D.A.O) it is very easy to interface both these applications. Hence we have selected Visual Basic as our front-end and MS Access as our back-end. Visual Basic will be used to create forms and interface with the database stored in MS Access.

Some features of Visual Basic are as follows:

1) Visual Basic is an object based programming language. In an event driven application, the code doesn't follow a predetermined path - it executes different code sections in response to events. Events can be triggered by user's actions, by messages from the system or other applications, or even from the application itself. The sequence of these events determines the sequence in which the code executes, thus the path through the application's code differs each time the program runs.

2) Visual Basic has a good graphical user interface.

3) Visual Basic programming for windows is more efficient. Working with windows involves three concepts - windows, events and messages. The Windows operating system manages all windows by assigning each one a unique id number. The system continually monitors each of these windows for signs of activities or events.

Each time an event occurs it causes a message to be sent to the operating system. Each window can then take the appropriate action based on its own instructions for dealing with that particular message.

4) With Visual Basic one can add controls like text boxes, command buttons, list boxes, etc. and communicate with other windows applications and access tables.

5) We can have multiple windows on the screen.

6) We can use Visual Basic to communicate with other applications running under windows OLE.

7) Multi-user applications can be developed in Visual Basic.

Creating an interface in Visual Basic:

Forms are the foundation for creating the interface of an application. They can be used to add windows, dialog boxes and controls to the application. The first step in building an interface is to create the forms that will be the basis of the interface. Then various controls are drawn on the form using the toolbox. The toolbox contains controls such as text boxes, command buttons, labels, etc. The next step is to set properties for the objects that have been created. This can be done easily through the properties window. The properties window consists of the following elements:

- Object Box: Displays the name of the object for which you can set the properties.
- Sort Tabs: Choose between an alphabetic listing of properties or a hierarchical view divided by logical categories.
- Properties List: The left column displays all the properties for the selected object. The settings can be viewed and edited in the next column.

Writing Code:

The code editor window is used for writing Visual Basic code. The code in the Visual Basic application is divided

into smaller blocks called procedures. An event procedure contains code that is executed when an event occurs. An event procedure for a control combines the control's actual name, an underscore and the event name.

2.2.3. Hardware requirements

The Examination Section is currently in possession of a single computer, using which marks are manually entered using Excel 97.

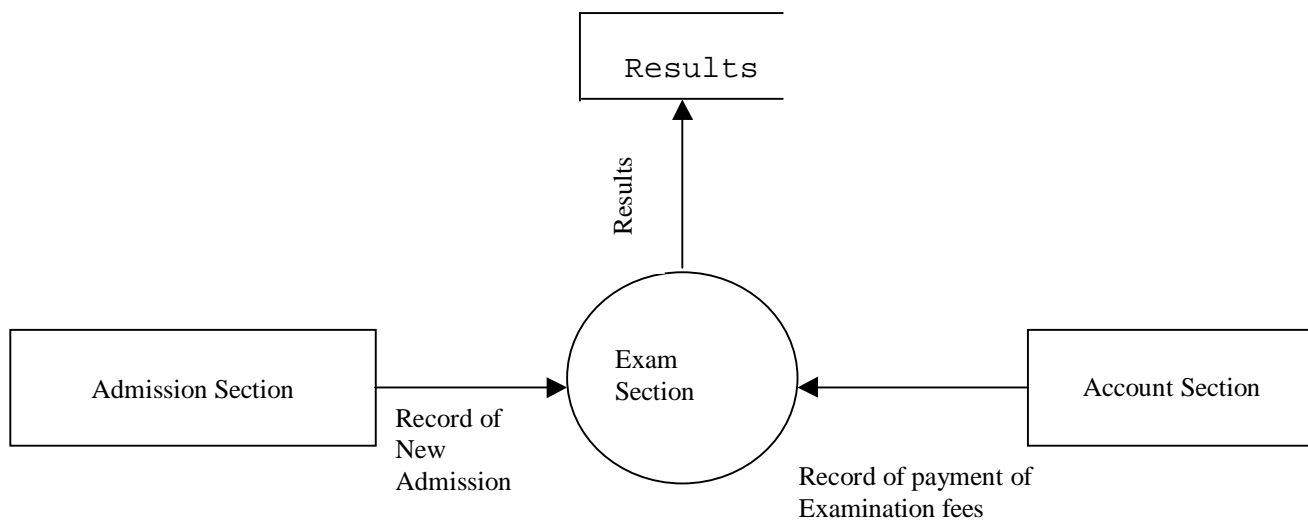
The additional hardware required for the implementation of the proposed system is estimated below.

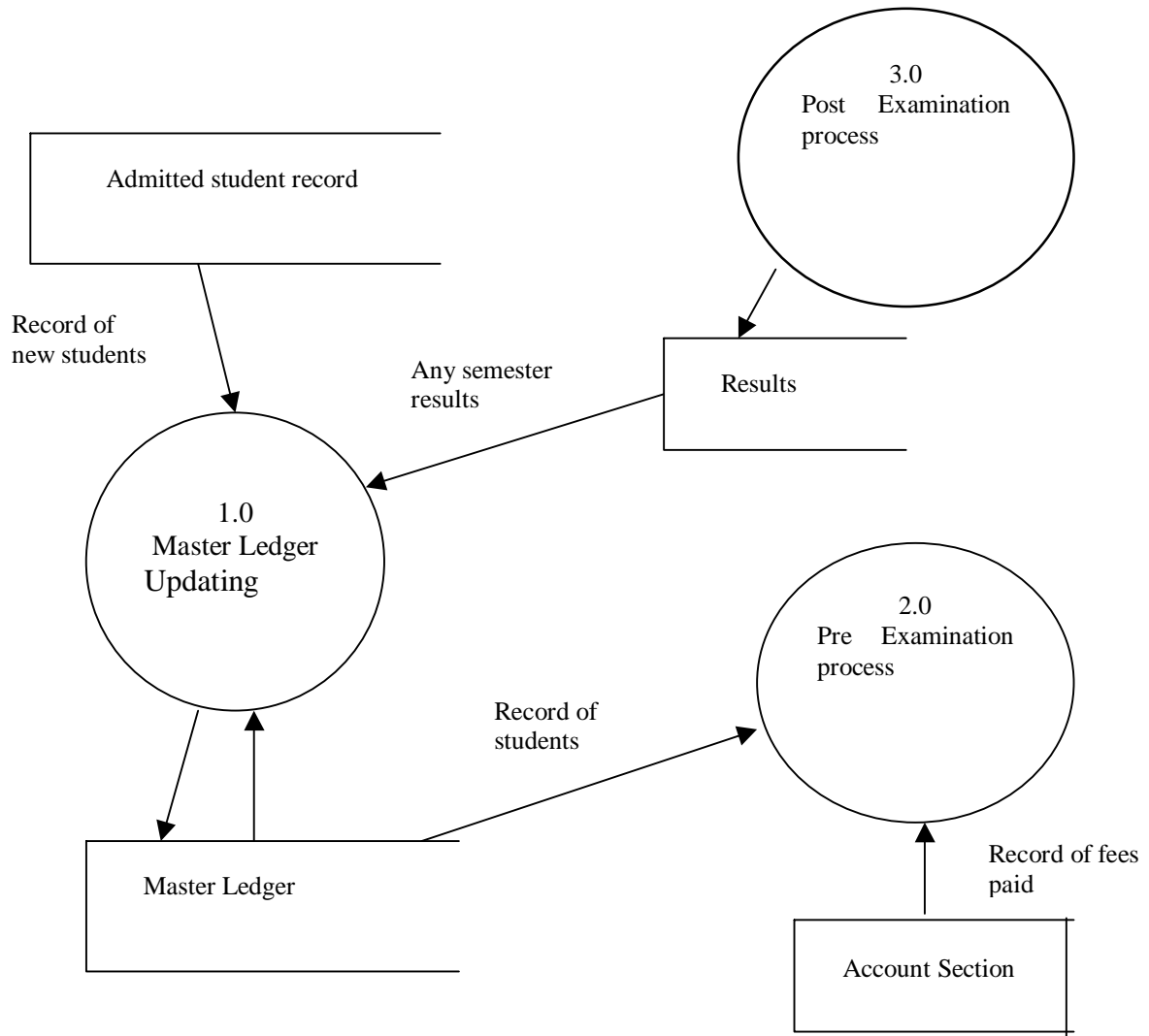
<u>Minimum Requirements</u>	<u>Recommended System</u>
Pentium @100MHz	Pentium-II @266MHz (2)
32MB RAM	64MB RAM
4.1GB HDD	8 GB HDD
1.44MB FDD	1.44MB FDD
	Flatbed Scanner

2.3. DFD and ER diagrams

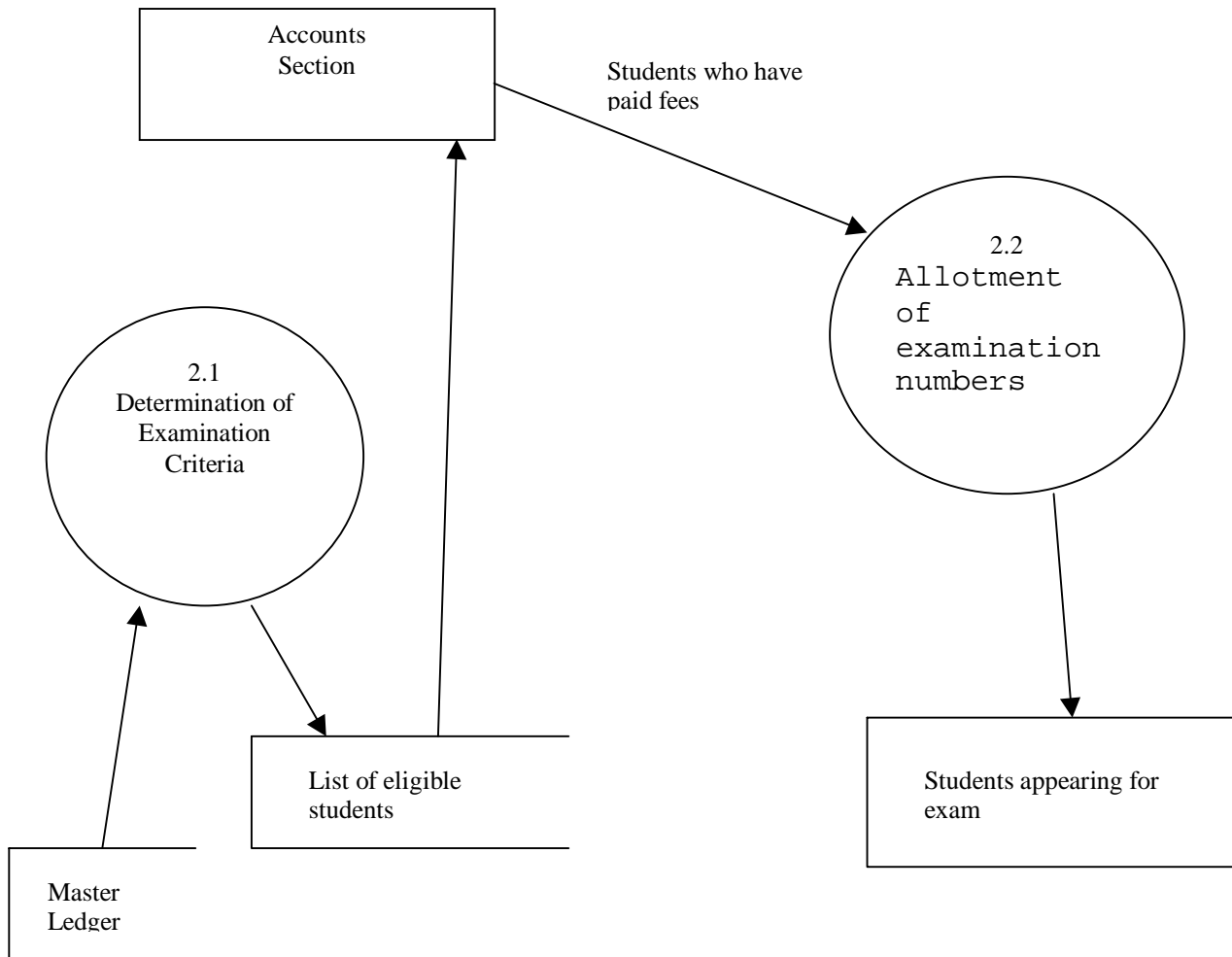
2.3.1. Data Flow Diagrams

Level 0 DFD

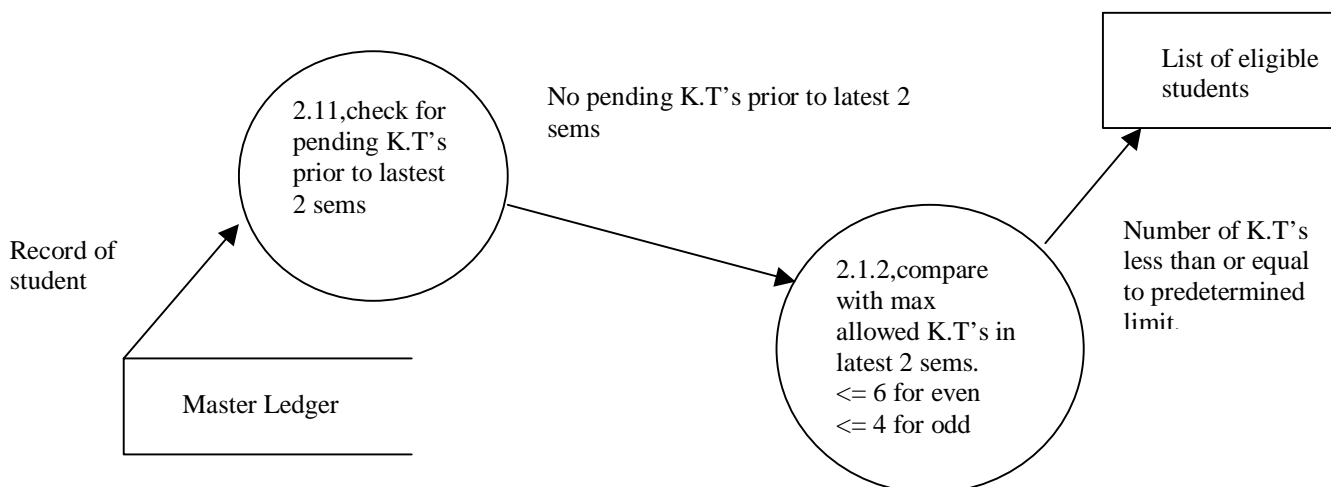


Level 1 DFD

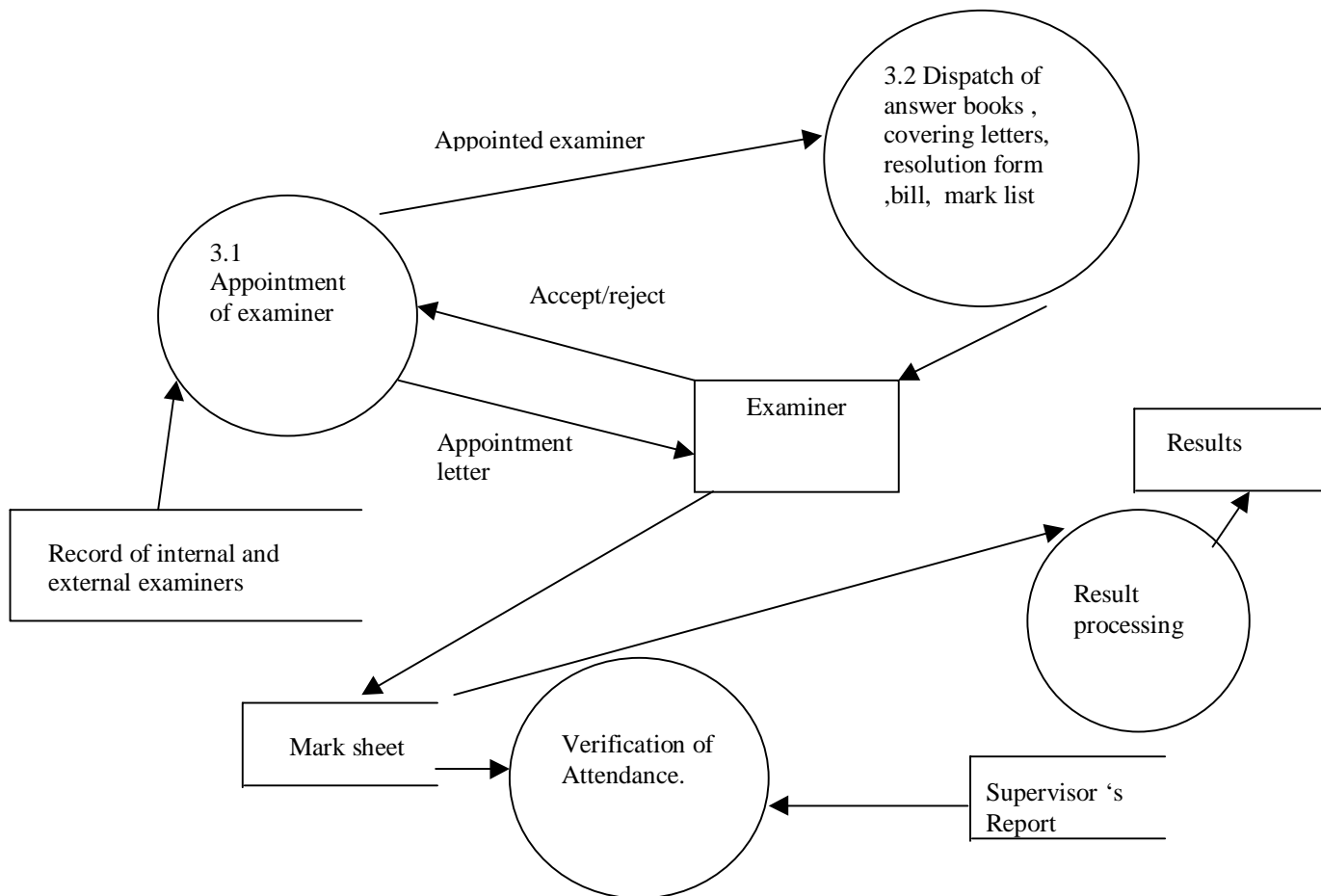
Level 2 DFD for pre Examination process



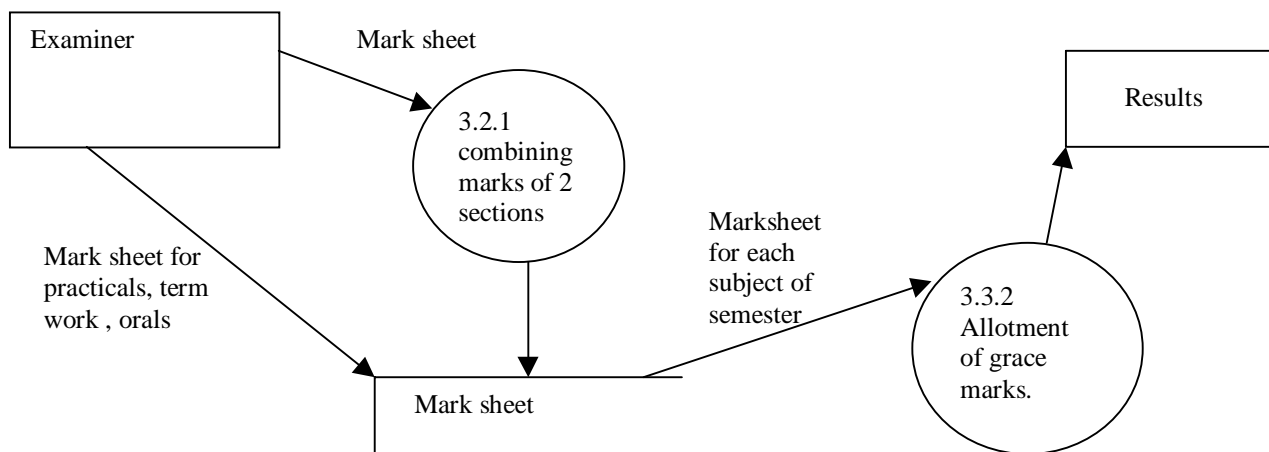
Level 3 DFD for pre Examination process



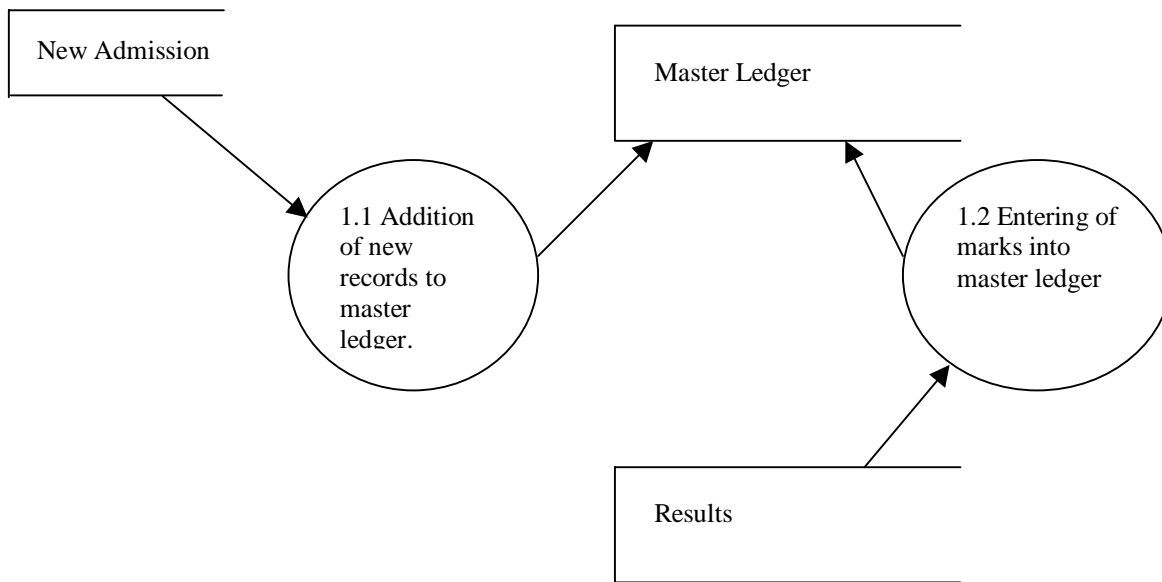
Level 2 DFD for post examination section.



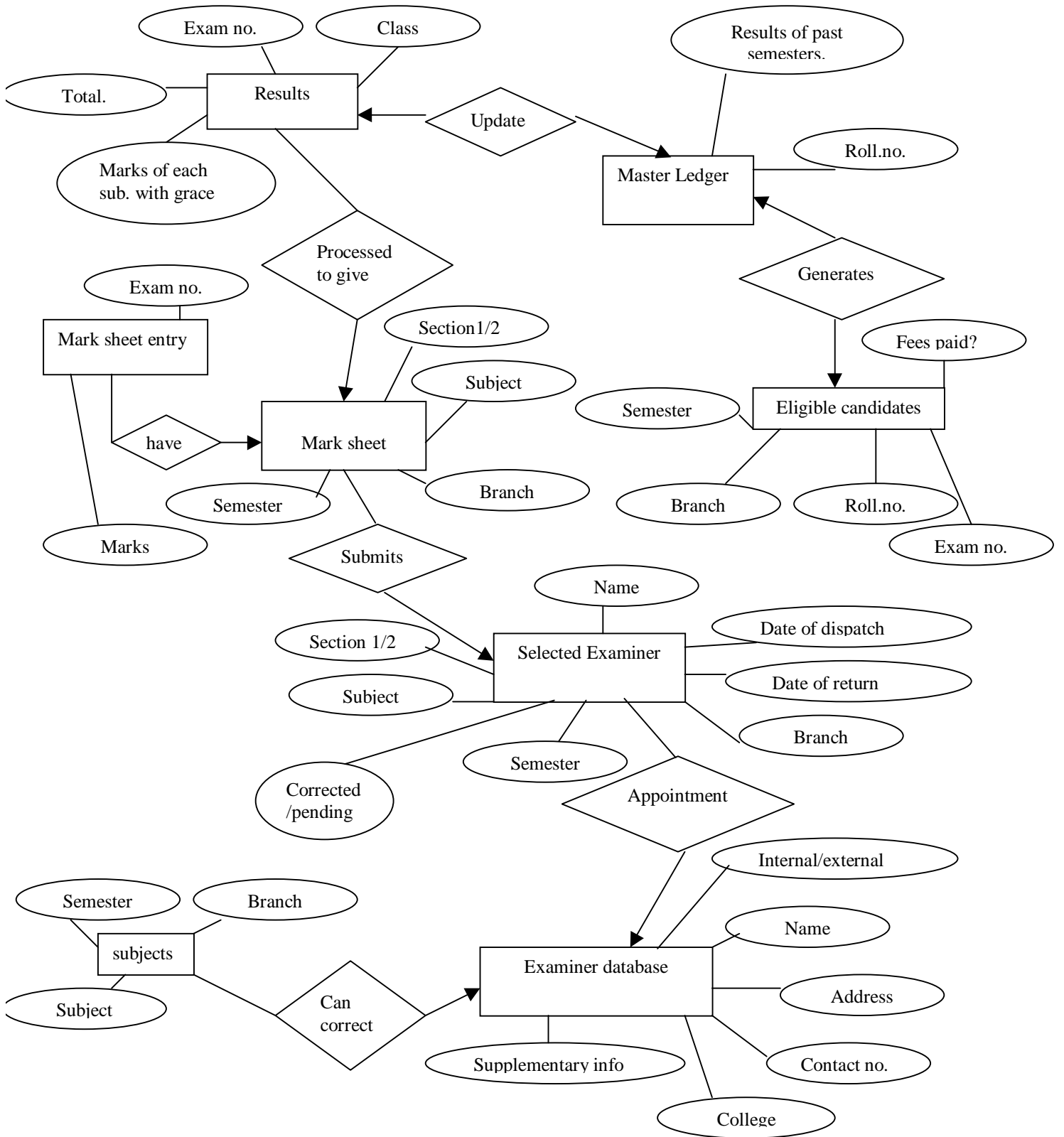
Level 3 DFD for result processing



Level 2 DFD for updating Master Ledger



2.3.2. ER Diagram



ER Diagram

3. System Design

3.1. Architecture of system - Proposals for new system

The systems study reveals a distinct need for an automated system to reduce the time delay caused by the various activities of the system. From the study it is obvious that the system should provide computer support for the following operations which are manual in the existing system: -

- 1) Master ledger is maintained as a table in Access using student roll-number as the primary key.
- 2) A procedure is written to display the list of students eligible for a particular semester examination. This procedure takes into consideration all the eligibility criteria mentioned previously.
- 3) Examination numbers are allotted to the eligible candidates and a table containing examination number and roll number is maintained. This table is used while updating the master ledger.
- 4) The supervisor report (attendance record) is entered. This record is compared with the mark sheet returned by the examiner and discrepancies (like marks awarded to an absentee or missing marks for a student present for the examination) are signaled.
- 5) Marks received from the examiner are entered. A procedure is written to combine the marks received for the two sections.
- 6) Procedure is written to handle the calculation of grace marks.

7) The master ledger is automatically updated.

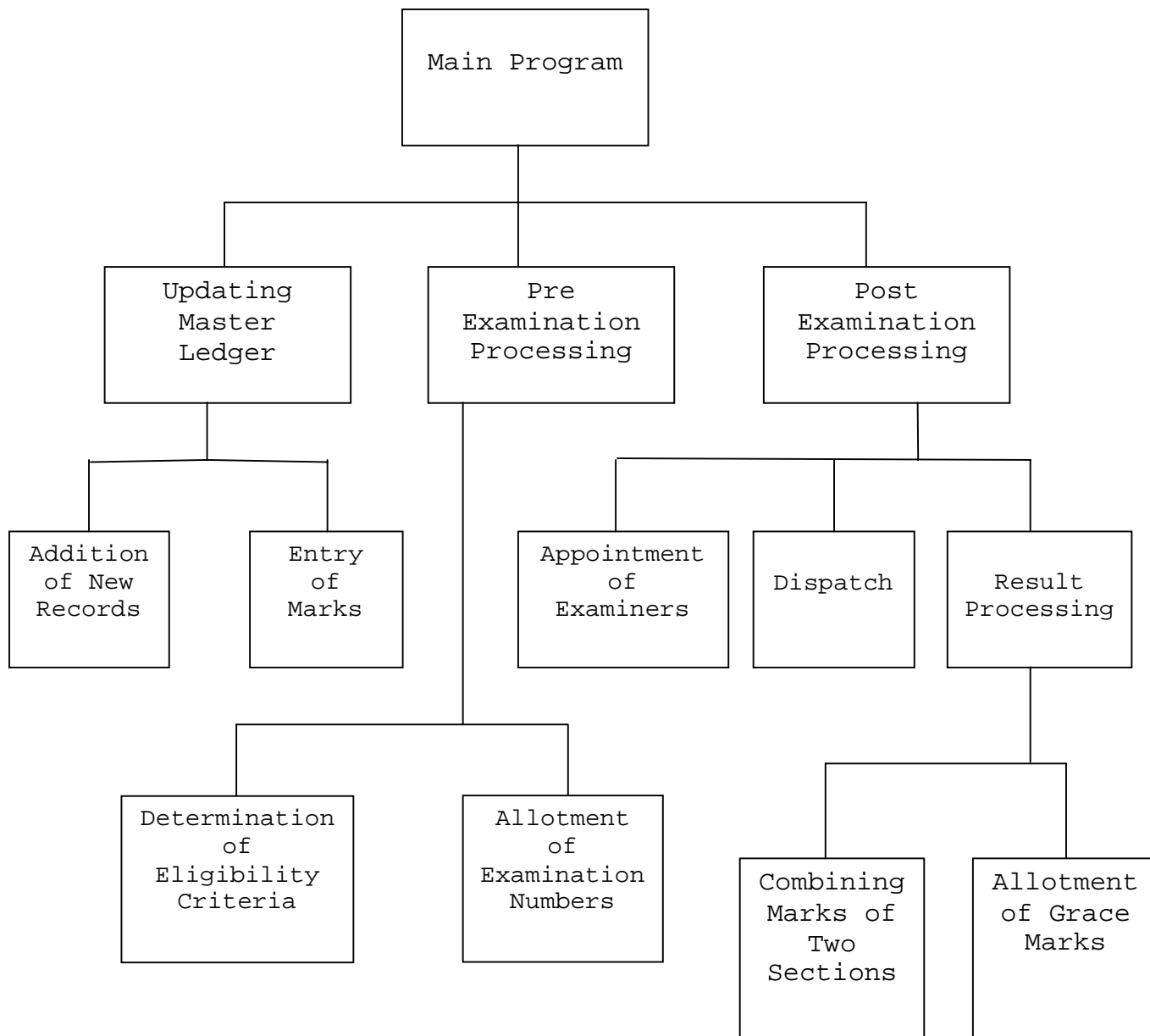
In addition to the above automation following changes are introduced into the new system:

1) Table containing the record of the internal and external examiners is maintained. This table contains personal information (like name, contact number, address), subject information (like subjects taught, college) and supplementary information.

The supplementary information contains past record of the examiner like whether he had earlier refused an appointment, or delayed the correction of answer papers, etc. This information is quite helpful in appointing an examiner.

2) A record is kept to indicate the date of dispatch of answer books and related matter. Also the date by which the corrected answer papers are expected is specified. This information is used to display automatic reminders if the papers are not received on time.

3.2. Modules



3.3. Database schema

We will be using the following tables for implementation of the system.

a. Master Ledger

- i) Roll number
- ii) Name of the student
- iii) Name and address of Father/Guardian
- iv) Age, date of birth
- v) Previous college and university attended
- vi) Last exam passed
- vii) Place of permanent residence
- viii) Date of admission
- ix) Category (blind, etc.)
- x) Class of year to which admitted
- xi) Results for individual semesters(semester I,II,III,...,VIII)
- xii) Transference certificate (if any)
- xiii) Date of leaving
- xiv) Reason of leaving
- xv) Remarks

b. Examiner Database

- i) Name
- ii) Address
- iii) Contact number
- iv) College
- v) Supplementary information
- vi) Internal/External

c. Subjects

- i) Semester
- ii) Branch
- iii) Subject name
- iv) Examiner name

d. Selected examiners

- i) Examiner name
- ii) Date of dispatch
- iii) Date of return
- iv) Subject name
- v) Semester
- vi) Branch
- vii) Section 1/Section 2
- viii) Corrected/pending

e. Eligible candidates

- i) Semester
- ii) Branch
- iii) Roll number
- iv) Fees paid
- v) Examination number

f. Mark sheet

- i) Semester
- ii) Branch
- iii) Examination number
- iv) Marks of all subjects

g. Results

- i) Examination number
- ii) Semester
- iii) Branch
- iv) Marks of all subjects
- v) Total
- vi) Class

4. Conclusion

In the preceding sections, we analyzed the working of the VJTI Main Office Exam section and identified some of its drawbacks. Along with this, we also proposed an automated system for the working of the Examinations Section. MS-Access was chosen as the platform for modeling the stores database, while Visual Basic 6 was selected for creating the user interface. The various forms and tables to be used in the automated system were identified. A part of the design has been implemented, and we propose to continue the implementation in our final semester. The new automated system for the Examination Section of VJTI Main Office will be made ready for use by the end of our final semester.

5. Bibliography

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