DESIGN AND DEVELOPMENT OF SYSTEMS IN LIBRARIES OF IITs

4.1) Elements of System

System requirements forms basis for system design specifications. Design document provides details on following three basic elements of computer system –

4.11) Hardware;
4.12) Software; and
4.13) Humanware.

4.11 Hardware:

By computer Hardware is meant the physical units which constitute the machine named computer. A computer system consists of a number of individual components, each performing a particular function. The basic system consists of a number of electronic equipments which work together to form the computer. Thus the physical, electronic and electro-mechanical components of the computer system are called Hardware. But keeping in view the objectives of this study the engineering of Hardware will not be appropriate. Instead the type of computers installed, their number and capabilities are the aspects considered relevant from the angle of automating the library services.
4.12 Software:

Generally the software is a set of instructions or programs written or developed to enable the computer to do desired operations. From the angle of this study only application software packages for library operations are to be considered. An application software package contains modules for all the specific activities that may concern a particular user group, e.g. an Application Software Package for library work contains modules for acquisition work, cataloguing, circulation, serial control, information storage and retrieval etc.

Selecting and Acquiring Application Software Package:

Though there are good reasons in support of acquiring a software package from a reputed agency rather than developing one in-house as for as most of the libraries are concerned. But the libraries of Indian Institutes of Technology have a different picture for the reasons that –

a) The libraries are special and belong to a parent organisation having a good team of computer scientists and engineers.

b) The libraries have huge collection and being used heavily had felt the need of automation almost two decades back.

c) The automation was planned in different stages using computer for various activities of the library.

d) The non-availability of application software packages for libraries to meet all the needs of such libraries.

e) Availability of different computer systems in different libraries.

It is for these reasons that the IIT libraries which made an attempt to automate some 15-20 years back had to struggle for years together to develop in-house
software package to meet the individual library’s needs and to suit with the available computer system. I witnessed the same in IIT, Mumbai, a team of most efficient computer scientists, Prof. (Dr.) H.B. Phatak and Dr. (Mrs.) Date worked with Mrs. V.S. Subbarao, I/C of periodical section from 1980 to 1986 to develop an application software for serial control on a trial and error basis to run it on EC 1030, a computer of third generation. It took them more than six years to run a program successfully on their system. Later in 1988, with the introduction of PC/AT, a menudriven system ‘PUSTAK’ was developed for circulation activities. For acquisition ‘POORTI’ was developed in house. For serial control a readymade package ‘SLIM’ was acquired. The library of IIT, Kanpur developed ‘IIT-KLAS’ in-house on ORACLE RDBMS version 7.0. It has ‘LEKHYA’- An acquisition module, ‘SUCHI’ – The cataloguing module, ‘CIRCULATION’, ‘PATRIKA’ – a serial control module. It also developed an on-line Academic Information centre.

The Library of IIT, Delhi after struggling enough to develop software in-house acquired ‘LIBSYS’ to computerise the library activities.

The library of IIT, Chennai has developed softwares on ISQL and ORALE. While the library of IIT, Kharagpur acquired LIBSYS for various activities.

**Qualities of a Library Application Software:**

Before acquiring a software package it is essential to ascertain whether or not the software package is of optimum usefulness for the library. An efficient software package for libraries should have the following qualities :-

i) DBMS Features

ii) High Level Integration

iii) Date Entry Facility
iv) Date Updating / Editing  
v) Search / Inquiries  
vi) Report / Display / Print  
vii) Menu – Driven and User Friendly  
viii) Compatibility  
ix) Reputation of the Sponsoring Agency  
x) Scope for local variation.

It may be relevant to give here a brief description of some important qualities –

**DBMS Features :-** It refers to a software that is developed for creating, organising, manipulation managing and arranging data in a data base. A DBMS creates inverted and other relevant files to facilitate search and retrieval of information. Word Star does not possess DBMS.

**High Level Integration :-** Software package for library work should incorporate various modules for different types of activities like circulation, acquisition, serial control, documentation etc. Since almost same basic bibliographical data is used in various modules, the package should possess high level integration to connect all the modules so that the data entered once in any module may be accessed and used automatically in other modules as and when needed.

**Data Entry and Updation :-** In each module except OPAC (On-line Public Access Catalogue) there should be provision for data entry and updation/editing. But at the same time it should have a facility for protection of these facilities so that only bonafide users may enter or update the data.

**Search Facility and Report :-** A library application software package should have very efficient and effective search facility under various modules by providing the
user at one place facility for putting any query. Results of the search or report to
the query should be instantaneously displayed or printed.

**Menu driven and Easy to Use :-** The package should have been developed in such
a way as it can be used even by a layman with a short training. If the user is held
up somewhere the package should offer help messages. Detailed and adequate
menus and sub-menus should be provided. It means that library application
software package requires not only high level programing (language) but also the
skill to visualise the complex and compound requirements of the library staff and
users.

**Compatibility :-** It means the quality to merge the data bases created by other
standard softwares or to be merged with other data bases created by other
software. In other words the packages must adhere to Common Communication
Format (C.C.F.) and international standards.

**Reputation of Sponsoring Agency :-** Before acquiring any software package the
agency responsible for the development / distribution of the software package,
must be assessed on the basis of certain factors like standing of the Agency or its
Agent, location, and number of service points, quality of software and services as
testified by previous customers, etc.

**Local Variation :-** In order to meet the requirements of individual libraries, which
obviously differ from library to library, the software should provide scope for
incorporating local variation and also provision for changing tag number etc. in
standard number to enable the particular library to take part in computerized
networks.
Software Packages for Library Operations :- Initially the general purpose program packages with some modifications were used for Library Operations, but later it was realised that separate and specific packages should be developed for library operations. IBM was perhaps the pioneer, in this regard, to develop the STAIRS (Storage and Information Retrieval System) package which was a main frame version. During last few decades number of software packages for library operations had been developed and being marketed on national and international levels. In fact it is not possible to have a correct account of all such software packages. However, CDS/ISIS, SUPERDOC, IV + V System, SCI-MATE, CAIRS, INMAGIC, MINISIS AND LIBSYS etc. are the most popular packages used for library operations. The principal features of these and a few more packages are as follows –

A) WORD STAR – Though not a library application package yet it is useful for libraries in many ways.

It is one of the most popular word processing software because of its user-friendly nature and simple commands. While working on Word Star necessary commands, functions and messages are displayed on the screen for the help of the users. It does not have Data Base Management capabilities, but is useful for libraries.

Word Star can be used –

a) To type a text;

b) To store the text in internal/external memory/ storage medium;

c) To edit the typed/stored text i.e. to correct mistakes, change, update, or delete any stored text;

d) To increase/decrease space between two lines / paragraphs;

e) To increase / decrease the margin (Right and Left);

f) To do all these jobs without disturbing the remaining part of the text;
g) To search/trace the desired portion of the text and replace it with other text;

h) To search for spelling mistakes and correct them automatically;

i) To do mail merge work;

j) To do cut and paste work;

k) To do other improvements eg. Bold, underline, lower, upper etc;

l) To display print or delete/erase a text or file.

B) dBase III Plus :- It is the third version of DBMS series for micro computers from Aston–Tate Corporation of USA. It is an user friendly, menu driven software which allows the user to do the following major functions –

i) Defining one or more data base.

ii) Searching, displaying and printing search results.

iii) Data entry, updating etc. facilities.

iv) Printing mailing tables.

v) Provisions for integrating various databases by writing short programs.

Some major commands of dBase are –

1) APPEND 2) BROWSE 3) CANCEL 4) CLEAR
5) CREATE 6) DELETE 7) DIR 7a) DIR/P
7b) DIR/W 8) DISPLAY 9) EDIT 10) ERASE
11) GO TO 12) INDEX 13) INSERT 14) LIST
15) MODIFY STRUCTURE 16) PACK 17) QUIT
18) RECALL 19) RENAME 20) SET 21) USE

C) CDS/ISIS :- It is a menu-driven generalized Information Storage and Retrieval system, designed specifically for computerised management of structured non-numerical databases. It has been designed and developed by UNESCO's
Division of Software Development and Applications Office of Information Programs and Services. National distributors of this software in India are NISSAT who are distributing it free of cost to the interested libraries. It is a Mini/Micro Computerised Documentation system that can handle any alphanumeric data of fixed or variable lengths. The file structure permits the users to add, modify and delete the records, gain access to master file via any element in the corresponding database, build index from any keywords and to create a variety of print formats like reports, catalogues, index etc. The package also supports ISO standard format to facilitate exchange of information among different systems. The software is highly useful and fast in creating bibliographical data bases for Information Storage and Retrieval. But, the menus provided in the software are not sufficient for house keeping operations and other services such as acquisition and circulation. However, the software allows creation of additional menus and writing programmes for all these activities through PASCAL turbo language. Its version 2-3 is a single use and version 3.0 facilitates multi-users access and provides additional provision for statistical data processing. DESIDOC have successfully modified the programs and new package, based on CDS/ISIS, under the name SANJAY has been developed.

Features of CDS/ISIS :-

a) The system allows its users to create non-numerical data-bases (i.e. data-bases whose major constituent is text).

b) Database can contain over 1,60,000,000 records.

c) Maximum size of display format is of 4,000 characters.

d) Menus and submenus provide options that may be chosen by the user to start work on any other item enumerated in menus and submenus.

e) It allows a user to create his/her own data base.
f) Allows the user to enter new records in a database and edit, modify, delete, print, display or browse the existing records.
g) Status information is displayed as soon as a data-base is selected.
h) Its indexing capabilities are extremely dependable and fast.
i) Its search facilities are simple, accurate and rapid.
j) Details of search results can be seen immediately on VDU and also can be printed or copied.
k) It allows the users to make their own menus or submenus and their own programmes through advance programming.

D) **SUPER DOC** :- It was developed by Thermodata Group in Grenoble (France). It is a user friendly file management and information retrieval package which possesses sufficient flexibility to serve for many applications in library and documentation centres. It can produce index, catalogue, bibliographies etc. This package can be used in an IBM compatible micro computer having an ANSI monitor controller.

E) **IV + V System** :- This system was developed by the Institute for Machine Documentation, Gray (Austria). It is conceived as a generalised DBMS intended for both bibliographic and factual information management. It is designed as an implementation of the relational database model. Basic system functions are; data entry / data editing, database creation and maintenance, retrieval and output. All DBMS and utility software in this system are written in UCSD Pascal. This system functions only in single user mode and is available for use on IBM PC-XT, IBM PC-AT, Wang PC and DEC Rainbow micro computers as well as the DEC PDP – II series using the single user operating system RT 11.

F) **SCI – MATE** :- It was developed by Institute for Scientific Information, Philadelphia (USA). It is a software for micro computers designed specifically
for menu-driven searching of a wide variety of on-line databases and for the
management of textual information. SCI-MATE's menu-driven command
system guides the user through searches on DIALOG, ISI, BRS, SDC and
MEDLINE databases, making the search process simpler while retaining the
original search capabilities of the host system. With the SCI-MATE Personal
Data Manager the user can create his/her own databases. The database can
contain any kind of textual information entered from the keyboard or can
include bits retrieval on-line with the universal on-line searcher and transfer
that data automatically to the Personal Data Manager.

G) CAIRS :- Computer Assisted Information/Library Retrieval System (CAIRS)
was developed in 1972 by Leather head Food Research Association, Surrey
(UK). The CAIRS runs on mainframes, minis, micros providing a total
automated system of information retrieval and management. The software is
appropriate for entry, indexing, storage and retrieval of text or numerical data.
The system permits four different methods of data entry. They are direct on-
line entry, batch data entry, document data preparation, and data prepared
using external systems, word processors or other computer or key-disk
systems.

H) INMAGIC :- It was developed by Warner Edison Associates. It is a flexible
data base design tool to organise information effectively and retrieve it quickly.
Version for minicomputers became available in 1980 and for micro computers
in 1984. Since then it has become very popular because of its range of
applications which is due to the flexibility of defining data structure, the
flexible report generator and the range of indexing options it provides.

I) MINISIS :- It is a generalised information management system applicable to
libraries. In 1976 International Development Research Centre (IDRC) began
work on the development of a low-cost minicomputer based package that could
be used for its own in-house needs and could also be made available to other institutions and would be flexible enough for use by industry. MINISIS became operational in 1978 and has since proved both its cost-effectiveness and adaptability. It does not require large mainframe computer. It is now an established member of the family of ISIS compatible systems.

Functional features of MINISIS are:

a) It is an information management package applicable to Libraries and Documentation Centres.

b) It does involve programming in the following Information storage and Retrieval operations done on data/records/files:

(i) Enter    (ii) Store    (iii) Check    (iv) Change
(v) Update   (vi) Transfer  (vii) Delete   (viii) Index
ix) Query/Retrieve (x) Compute  (xi) Print

c) It has standardized data.

d) It has no redundancy of data stored.

e) Has no in consistency of data stored.

f) Has provisions for optimally utilizing computer resources such as memory.

g) Supports multi-users of various levels of sophistication.

h) Interacts with the users through simple statements/commands and hence easy to operate.

i) Facilitates fast accessing of information.

j) Has the capability of queering synonymous/similar/related data items.

k) Has the capability of retrieving a data by knowing only a part of the data.

l) Performs mathematical operations within/across records.
m) Has capability to print reports at various stages such as ‘entry’, ‘modify’, ‘post-index’, and compute etc.

n) Generates reports periodically on various aspects.

o) Is flexible enough to get linked to MINISIS user-written programs for house keeping purposes.

p) Allows batch mode operations.

q) Provides access to information stored in various languages such as Spanish, French, Arabic, Thai etc.

r) Helps sharing or distribution of information with many leading National/International Information Centres.

s) Can be used to prepare Computer Output Microfiche.

t) Has a full range of utilities to assist the database administrator in creating and maintaining databases.

J) SANJAY :- The software package can be said to as modified and extended form of CDS/ISIS. It has been developed by DESIDOC. Since CDS/ISIS lacks programmes for house keeping activities and programme for each of these activities have to be created in it and integrated by Pascal Programmes which is not possible for all Library professionals so in SANJAY through 25 Pascal programmes facilities for house keeping jobs have been provided. Details of this programme can be had from NISSAT.

K) MAITREY 1 – This software has been developed by Computer Maintenance Corporation of India (CMC) for CALIBNET. This provides facilities for all jobs relating to house keeping and services. This software may be bought from CMC, Calcutta.

L) WYLYSYS :- Wipro Library system has been developed by WIPRO Computers Ltd. It has facilities for library housekeeping and services.
M) **DELMS** :- Defence Library Management System has been developed by DESIDOC for use in its library and libraries of DRDO. It has facilities for all library housekeeping and services. It can be had free of charge from DESIDOC by any institution.

N) **LIBSYS** :- Developed by Info-Tech consultants New Delhi. It is a useful menu driven package for use in libraries.

The software selected by the libraries should be flexible, easy to learn and operate and compatible on the network applications. CDS/ISIS is a versatile and user friendly software. It is used by maximum number of libraries. CDS/ISIS is flexible and efficient for having textual information, but compilation of status report and duplicate checking is not possible. This package is economical and is internationally accepted for use in Library and Information work. The use of in house developed software is preferred by several libraries for the reason that it is their own need-based package and is more comfortable than others. Also it enables the utilization of resources within the institution and the system can be modified according to needs. The in-house packages are based on some programming languages like COBOL, C, BASIC, PASCAL etc. and on some readymade packages such as CDS/ISIS, TULIP, WordStar, dBase III and IV, LOTUS 1,2,3 etc. Some commercial readymade packages such as LIBSYS, SANJAY, SLIM, MINISIS are also being used by the libraries. LIBSYS is user friendly and simple to operate.

Out of a total number of more than 2000 Library Application Software packages available World wide approximately 200 are being used in India. Besides the software packages listed in preceding paragraphs the libraries may choose one out of HEADLINE, SWIFT, UNDERLINK, CORTEX etc.
4.13 Humanware:

For effective and efficient services of libraries and information centres computer is only an extension of the human brain’s function of data processing and its manipulation by a specially designed machine. Therefore human beings form the most important component of a computer system. The man-machine interface is so vital that human component of the computer system is termed a ‘Humanware’. In a conventional library, it is the skills, talent, devotion to work and enthusiasm of the staff which brings perfection to library services and a good reputation to the organisation. Similarly, it is the skills of human beings, associated with a reliable computer system, which go to make for a successful computer-based Library and Information system. It can be said that the first and most important requirement for computerising library and information services is the availability of qualified and experienced staff. Not only for operating the system but also during the stages of actively specifying, designing, programming, testing and installing a computer based system, senior experienced staff are clearly needed.

Team for Computerisation :- Having realized the importance of skilled staff for computerisation the next consideration is that what should be the qualification and experience of the staff how is to apply Computer and Telecommunication Technology in Library. Infact, such staff should possess the professional knowledge of Library and Information activities as well as the technical knowledge of computer and its implications. The staff ought to have experience in operating computer system.

Since most of the Indian libraries are still in their cradle stage of computerisation, the experienced and senior staff holding responsible position in them are though masters of library and Information techniques and possess experience of practical problems but do not have adequate knowledge of computer technology. it is,
therefore, advised that the team responsible for computerisation should have a combination of both, library professionals and computer professionals. The library professionals must be able to act as a means of communication between the library staff and computer professionals who design the system, write and test the programmes. The computer professionals should be skilled and experienced in system analysis and design as well as in operating procedures and programming.

A computerised Library and Information System in its humanware has to include the following personnel –

a) Subject experts  
b) Software engineer  
c) Library and Information Science experts.  
d) Hardware / maintenance engineers.  
e) System analysts.  
f) Programmers  
g) Computer technicians/operators.  
h) Data entry operators.

**Humanware Development:** All the categories of humanware, listed above, are not needed continuously. Some of them are needed only at the stages of installation or initial organisation and development only. For efficient Library and Information system the Library staff should be given excellent education and training in the application of computers. For this purpose, while on the one hand the posts for such staff may be created who are skilled in both the disciplines i.e. Library an Information Science and Computer Science, and on the other hand the existing library staff must be trained in computer operation by deputing them for short term courses or refresher courses etc. in this discipline. The syllabi of B.Lib. I.Sc. and M.Lib. I.Sc. have to be restructured to include within them computer and
communication technologies, Information Management, Information Technology etc.

**Human ware: Categories and Qualifications**

<table>
<thead>
<tr>
<th>Designation</th>
<th>Qualifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Librarian Gr. III for data entry</td>
<td>M.Lib. I.Sc. with one year experience in computer applications.</td>
</tr>
<tr>
<td>Librarian Gr. II for supervising the section</td>
<td>M.L. I.Sc. with 5 years experience in computer applications to library services.</td>
</tr>
<tr>
<td>Librarian Gr. I Head of College/Research Inst.</td>
<td>M.L.I.Sc and M.C.A. or P.G.D.C.A. or 10 yrs. Experience in managing computerised information system.</td>
</tr>
<tr>
<td>Chief Librarian Universities/Institutes deemed to be university.</td>
<td>M.L.I.S.C., M.C.A. or P.G.D.C.A., Doctorate or published work of high standard an 10 yrs. Experience in managing computerised library systems.</td>
</tr>
</tbody>
</table>

**Quality of Humanware:** Human aspects are all pervasive and play a vital role at all stages of computerised system's development and operation. So investment in human resource development is to be regarded as the most significant element in computerised Library and Information Systems. In this fast changing environment the Library and Information workers are required to possess enhanced managerial, professional and technical skills, adequate knowledge and right kind of experience. The humanware should be so competent and trained as they can anticipate changes and respond to them, seize opportunities at the right time and
take initiative whenever necessary. They must possess flexibility of attitude, imagination and scientific bend of mind.

4.2 System Study of Available at I.I.T. Libraries

An attempt is being made here to study the system details of the Libraries of Indian Institutes of Technology, putting emphasis on the Hardware available, Software developed/applied and the Humanware engaged in computerisation and its operation.

4.2.1. Hardware :- The particulars of Hardware available with central library of each of the Indian Institute of Technology are described below one by one –

IIT, Kanpur Library has Compaq Pro. having speed 200 MHz, memory 32 MB RAM, HDD 2.1 GB, SV.GA colour monitor, 2 serial one parallel port, one floppy Drive, one CD-Drive and Ethernet card; DEC 3000/600 having speed 175 MHz, memory 64 MB RAM, Disk space 4.5 GB, DAT Drive, CD-ROM Drive, and Ethernet card; L-Pentium Total – 2TVP = 6(432 MB RAM & 216 MB RAM) having 32 Bit PCI Ethernate interface with UTP & BNC Port, 2” x CD – ROM Drive, 14” non Interlaced colour monitor, PC with Pentium 166 Mtz atleast 4 PCIH 3 ISA Slots, 256 KB Cache 1 GB DD, 1.44 MB Fdd., PCI VGA Adapter with 1 MBD RAM MS Mouse, 104 Kbd, 200 watt MPS; and HCL Pentium 5 having 16 Bit ISA Ethernet interface with UTP and BNC ports, PC Pentium II 200 Mtz MMZE atleast 3 PCI + 256 KB Cache 16 MB RAM 2.1 GB HDD, 1.44 MB fdd, 14” colour monitor PCI VGA adapter with 2 MB V RAM, 1 Parallel port 104 kbd 200 W SMPS mouse.

Compaq Prollant – 2500 pentium pro server 200 MHZ 256 KB High Speed 4 way set associate cache 32 Bit RAM, 2.1 GB Fast Wide SCSI-Z Hard Disk Quad speed
CD-ROM, 1.44 MB fdd, Integrated network Card, 14” SVGA Colour monitor, 2 serial and a parallel port compaq insight manager smart start is one in number.

Zenith (4 numbers) with 5.25” 1.2 MB fdd, 16 MB RAM, 8 X CD-ROM, 14” 028 MM DP or better Non Interlaced colour monitor, PC with Pentium 100 Mtz atleast 3 PCI and 2 ISA Slots, 1.44 MB fdd, mouse.

Zenith (1 number) Pentium @ 100 Mtz, 16 MB RAM, 256 KB Cache, 1.2 GB HDD, 8 X CD – ROM, 1.44 MB fdd, 14” Mono Monitor, Mouse, Kbd.

Zenith (1 number – micro monitor, 1.44 MB, 3 ½” fdd, 40 MB HDD, 1 CD-ROM. (486 Configuration). Wipro (386 Configuration) (2 PC) 1.2 MB fdd, 40 MB HDD, 1 MB RAM, 2 CD-ROM, Keyboard. Zenith (386 Configuration) (2 PC) 1.2 MB 5” fdd and 1.44 MB” 3” fdd, 40 MB HDD, 1 MB RAM, Mono Monitor, 101 Kbd.

**Terminals :-**

SMA 100 –

Not working ............... 14
Working .................... 07

HCT 1100 –

Working – 05

CC –

Not working – 01

PC X T

HCL –
Not Working (3)

SHYAM – Not working (3)

SHYAM – Working (2)

PC – 386

Wipro – Not working (1)

Wipro – Working (1)

Zenith – Working (2)

Upgraded – Working (1)

PC – 486

Zenith – Working (1)

Pentium

Zenith – Working (5)

HCL – HP – Working (13)

DEC – Alpha – Working (1)

Compaq – Working (1)

Printers

L & T – 7

L X 86 – 3

DL 3400 – 1

EPSON LQ 100- 2
LASER - 2
Wipro LQ 1050 – 4
Inkjet 670 C - 1
IIT, Delhi Library has 5 IBM, 1 Compaq, 5 Assembled and 5 PCL – 5 Computers. The specifications are 32 – bit, 266 MHz, 4.0 GB. This library has total 30 terminals, 2 terminal controllers, 37 PCS (Pentium, Pentium II and Pentium III) and 4 servers spread over 3 floors of the library. The library has its own sub-LAN which in turn is connected to the campus LAN. All 30 terminals, 37 PCs and 4 servers are connected to the Campus LAN.

PRINTERS

HP Laserjet (42)

IIT, Madras (Chennai) Library has 1 mainframe (specification not provided) with 24 terminals and 20 PCs.

Printers.

Laser and Dot Matrix printers total 18 in number (Details not provided).

IIT, Bombay (Mumbai) Library has Maxman, Pentium mainframe computer systems and 22 terminals. It also has 17 PCs 386 having 40 MHz and 4 MB RAM. Input is through keyboard, floppies, CDs and downloading databases.

Printers

132 columns Laser printers – 8
80 columns Laser printers – 2  Total 10 Laser printers.
The speed of printers is 6 pages per minute and 600 d.p.s. respectively.

IIT, Kharagpur Library has HCL-HP, PCL, Meteer – III and HCL – Infiniti. It has 16 Unix terminals and 12 PCs. Meteer – III has SCO Unix 4.32 of 16 bits and Pentium Pro has SCO Unix 5.02 of 32 bits. The speed of processing is 50 MHz and 166 MHz. The memory is 16 MB RAM, 150 MB HDD, 128 MB RAM, 12 GB HDD. The input/output devices are 5.0” and 3.5” FDD, Mag. Tape (150 MB), and 5.25” and 3.5” FDD Mag. Disc, CD-ROM drive and 5 VGA.

Printers

5.1 L & T scribe 36 Dot Matrix (06 nos.)
HP Laser Jet .5 Si (01 no.)

The Library of IIT, Guwahati has IBM, HCL and Compaq computers. These are personal computers and the library has 13 terminals. The internal memory is 3.21 GB and 4.1 GB. The input/output devices are keyboard, floppies, CD-Drives, printer etc. It has one laser printer and one Barcode printer. The library being small in size and comparatively new has a smaller set up of hardware. But it is reported to be sufficient for their present requirements.

The library of IIT, Roorkee has 01 Pentium III server with 800 mhz CPU speed, 256 MB RAM, Hard Disk capacity 20 GB, CD-ROM capacity of 52X and Ethernet card 10/100 mbps; 01 Pentium II server of CPU speed 300 mhz, 64 MB RAM, Hard Disk capacity of 4 GB, CD – ROM capacity of 32X and Ethernet card 10/100 mbps; 01 Pentium MMX server of CPU speed 200 mhz, 64 MB RAM, Hard Disk capacity of 4 GB, CD-ROM capacity of 32X and Ethernet card 10/100 mbps; and 02 CD-ROM servers each with 14 CD tower 32x X 40x and Ethernet
card 10/100 mbps. The library has in all 16 nodes i.e. 03 Pentium III of CPU speed 550/850 mhz, 64/128 MB RAM, 8 GB/20 GB Hard Disk capacity, CD-ROM capacity of 52X and Ethernet card 10/100 mbps; 02 Pentium II of CPU speed 200/366 mhz, 32 MB RAM, 2 GB Hard Disk capacity, CD-ROM capacity of 40X and Ethernet card 10/100 mbps; 10 Pentium MMX of CPU speeds 100/133/166 mhz, 16/32 MB RAM, 2 GB Hard Disk capacity, CD-ROM capacity of 24X and Ethernet card 10/100 mbps; and 01 Pentium of CPU speed 33 mhz, 8 MB RAM, 1 GB Hard Disk capacity and CD-ROM capacity of 8X. This library has 6 dot matrix printers of 132 columns and 3 laser printers. For networking it uses CAT cables and one switch 4 networking hub. It has 2 barcode scanners and one A3 scanner bed. 02 CD writers, 03 UPS of 1 KVA each and 02 CD Exchanger each with 6 CD are the other hardwares available in the library.

4.2.2 Software:

The Libraries of different Indian Institutes of Technology have followed varied practices in using the software. Some of them gone to develop their domestic software for most of their computerization and for a few bought readymade packages e.g. Libraries of IIT, Kanpur, Mumbai, Delhi and Chennai, while on the other hand Library of IIT, Kharagpur used LIBSYS. However, the particulars of Software, as reported by the Libraries individually, are as follows –

IIT, Kanpur Library developed a fully integrated Library Automation Package under the name iit-KLAS for computerizing the various functions of the library. It is a user – friendly solution offering complete functionality. The day-to-day tasks performed in the library are much easier to accomplish with iit-KLAS, thereby increasing the overall efficiency of the library. The iit-KLAS has been designed and developed locally by a team of library professionals from Central library and software professionals from Department of computer Science and Engineering.
The main objective has been to make the system simple to operate and yet offer comprehensive functionality. The understanding of human and organizational realities has been a central factor in its conception. The package has been developed on ORACLE RDBS version 7.0 This means that iit-KLAS is not tied to any computer make or model but can run on a range of host computers from desktop micros to mainframes. By using an RDBMS iit-KLAS gets the advantage of Vigorous database features such as concurrency, recovery and transaction rollback capabilities which ensure the integrity of the database. It is easy to extend and incorporate new features and capabilities.

iit-KLAS offers simplicity of use with forms-based user-friendly interfaces and the operators requires negligible training. It is entirely menu-driven with well-planned and designed screens providing meaningful on-line messages. This software has been in use at IIT, Kanpur for over 7 years and has a proven track record of performance and reliability in responding to the rigorous demands of the users as well offering extensive configurability. It permits the library to associate special authorization levels appropriate to each user’s responsibilities. Individualized passwords on the login screen prevents unauthorized access. This gives important control for governing usage and protects the integrity of the database. The various modules of iit-KLAS are described, in brief as under –

a) **LEKHYA** – The Acquisition module handles the acquisition of all accessioned items. Its functions include ordering and budget control. Some of its features are:

Pre – order searching with access to catalogue search.

Entry of indents.

Generation and printing of purchase orders.
Cancellation/confirmation of purchase orders.
Claiming facilities for overdue orders.
Foreign currency conversion.
Vendor records management.
Receiving and Accessioning.
Invoice processing.
Multi-department budget control
Instant update of budgetary commitments and expenditures.
Fiscal year set-up.
Several access points—by title, author, indent number, purchase order number, department, requester and publisher.
Requester Arrival Notices.

Indent status accessible to requesters through Academic Information centre.

b) SUCHI — The cataloguing module supports the Technical Processing function of the Library. It is used to build and maintain the database used by all other modules. Bibliographic data is entered only once. The features of ‘SUCHI’ include:

Records creation for books, reference material, text books, thesis, technical reports etc.
Easy data entry without requiring extensive knowledge of cataloguing.
Only fields for which data exists need be filled.
Validation of fields.
Display of catalogue cards on-screen for verification before printing.
Printing of catalogue cards for Shelf – List, Title and all added entries.
Catalogue cards printed individually or in batch mode.
Generation of list of new additions, and author/subject/title indices.
Generation of new arrival listing.

C) CIRCULATION – This module of iit-KLAS has been designed to ease the load of heavy issue/return transactions by fast response times. This program implements the circulation policies more effectively. Its features are:

Easy issue and re-issue
Rapid member registration and clearance.
Retrieval of member by member ID for all transactions. Verification of member status prior to all transactions. Automatic due date calculation by member/item type. Automatic fine calculation and posting.

Special issue.
Reduction of issue duration for items on reservations.
Reservations by title or copy.
Multiple member categories.
Configurable circulation policies (Parameters include duration of issue, issue limit by member category, fine rate etc.).
Lost items management.

Off-Line circulation.
Sophisticated security featuring privileged access to system options.
Transaction logging.
Statistics.
Overdue, fine notices, reservation slips.
Reports (items issued/returned, member overdue activity etc.).
Selective purging of fines.
Holiday list management.
c) **Patrika** – Serials control module automates the task of managing journals’ subscriptions. It supports the following features.

**Subscriptions:**
Ordering and renewal of journals by supplier or individually. Adding, editing, cancelling subscriptions. Package subscriptions.

Invoice processing featuring automatic update of budgetory commitment/expenditure.

**Invoice Reminders.**
Form A2 / Payment/Refund processing.
Supplier database management.

**Receiving:**
Receiving of individual issues of any subscription year.
Automatic generation of missing issues.

**Claim processing:**
Identification of expected issues and subscriptions for which supply has not begun.

Printing of claim letters by supplier.

On-line queries of claimed/unclaimed issues.

**On-line queries:**
Subscription details.
Received issues.
Subscriptions pending invoicing/payments.
Paid journals by department.

Reports:
Journal listing by supplier, department
Payment status by department.
List of active subscriptions.

d) AIC – The on-line Academic Information Centre is fully integrated with all the other modules of iit-KLAS. It is the window through which members search and view information generated by other modules. AIC features user services such as:

On-line catalogue search:
Item availability status updated in real time. Search by author, title, call number and accession number.

Context – sensitive help screens.
Shows availability status for all copies.
Browsing of search results in three levels of detail.
‘Current contents’ search: Latest 20 issues of ‘Current Contents’ available for three different disciplines.

Searching by journal name, subject and keywords. Search results displayed in Table of contents format.
Detailed information for each article available on touch of a key.

New Arrival: Displays list of books and CD-ROM based databases that have been received in the last week.
Information displayed for CD-ROM based databases includes description and the period covered.

**Journal Subscriptions:**
Searches by journal name and/or department.
Displays the location and the latest issue received.

**Circulation Queries:**
Allows members to review their fines, issues and reservations.
Lists non-accessioned items on loan.
Direct access to item availability by accession number.

**‘Current Contents’ Profile Entry:**
Members provide their search profile comprising of maximum ten queries.
Each query consists of discipline, journal name and keywords.
Journals listing provided for each discipline for selection of journal name.

Wild card searching facility for keywords.

Search results sent by electronic mail to members.
Search profile including e-mail addresses saved. Profiles run on latest ‘Current Contents’ issue received.

**Book Indent Queries:**
Allows requesters to view indent status-indent received, ordered, item received etc.
Search the index database by title, author, requester, department, publisher etc.
Displays date of order, date of accessioning and other details.

The continuous enhancement and day-to-day operations of iit-KLAS is being taken care by a full-fledged Library Automation Division of the central library. This division comprises of computer professionals and library science professionals, trained in the area of information systems. In addition to the services mentioned above, the Library offers computer-Aided-Reference-Services (CARS) which provides over 20 different CD-ROM based databases such as Match Sci disc, compendex plus, SocioFile, Psych Lit and Comparch. The library provides monthly Current Awareness Services (CAS) in Mathematics, Psychology, Sociology, Management, Chemical Engineering, Mechanical Engg, Civil Engg., Computer Science and Electrical and Electronics Engg. Currently iit-KLAS is running on a DEC Alpha 3000/600. The system is having 25 terminals distributed throughout and connected by LAN.

IIT, Delhi Library initially developed a software locally under the name LIS in C++ language for their house-keeping routines and In-house databases were developed using micro CDS/ISIS package of UNESCO. In 1998, the LIBSYS package – a commercial package was bought and has been fully implemented for computerization of all the in-house activities in the Library, mainly Acquisition, circulation, cataloguing and serial control. The data entry of current serials is in progress. The system administration of different interfaces of Library Computerization and regular updating of OPAC and Library Home Page is done by Computer Application Division of Library. The library is developing web-based Digitized collection for distant and continuing Education in Information Technology. A Demonstrative Project on Internet-based online Interactive courseware was funded by the Ministry of Information Technology. The online Directory of Courseware is already available on the Internet and is being updated
regularly. The development and maintenance of Institute’s Web Page funded by IRD, IIT, Delhi has been implemented.

The in house databases which had been developed by the library using micro CDS/ISIS have been recently been ported to Java ISIS Interface so as to facilitate simultaneous access to the users on Internet and Intranet. These databases are –

Database of Serials in Central Library.
Database of Text book collection.
Database of Book Bank Collection available in the Central Library.
Database of Ph.D. Thesis submitted to the IIT, Delhi.

The Library Home Page is an integrated interface for all computer and web-based services available in Central Library. The interface available at the Library Internet server offers the following information/services-

Guide to the Central Library.
Collections and Library Services.
Library Layouts and Floor plans.
Library Hours and Membership.
Computerization Programme.
Network connections.
Web-based Library OPAC.
Web-based online journals’ Kardex.
TELNET to DELNET Databases.
Link to CDNET System on Campus LAN.
Recent Additions to the Book collections.
Web-based access to full-text e-journals.
Link to collection Digitized in-house.
Web interface to database-serial, Text books, Book Bank, and theses etc. developed in-house.

In addition to more than 800 titles of current journals (Print form) and above 90,000 bound volumes of the journals, about 1400 electronic journals can also be accessed full-text through the following main e-publishers’ sites-

Science direct (Elsevier Science)
American Physical Society
American Institute of Physics
ACM Digital conference Library.
American Society of Civil Engineers.
Nature Magazine.
IEEE ASPP

The Library offers network-based CD-ROM search services which can be accessed anywhere on campus LAN. For accessing CD-ROM databases available on campus LAN there is a need to configure your internet enabled PC as a client to the window NT server. This server hosts the CD networking software and is hooked to the CD-ROM Tower having multiple number of CD-ROM drives. The detailed procedure for configuration of PC is also available at the Library Home Page. For the members who lack computing facility 15 pentium machines have been installed in the Computer Application Division of the Library to facilitate CD ROM search services from within the Library. These workstations are also used for accessing web-based online electronic journals as well as other electronic resources available on internet. The Library subscribes to the following 12 CD ROM databases -

Inspec, 1990 onwards.
METADEX, 1990 onwards.
Derwent Biotechnology Abstracts, 1982 onwards.
World Textile, 1970 onwards.
Business Periodical Index, 1982 onwards.
EXIM – India on CD
LISA plus
Induscope : India’s Industry Database

Indian Standards on CD ROM

The Online Public Access Catalogue (OPAC) of Library is operational both on Internet and Intranet. It can access to search more than 1,30,000 bibliographic records of books, available in the library database through Web-based search interface or with Window clients of the LIBSYS on Intranet. The OPAC facility also provides information about new arrivals of issues of journals/supply status of the current journals in the Library (Kardex record of journals for the year 2001). The web-based OPAC can be accessed through the Institute’s Home Page. It can also be accessed through the Library’s Home Page.

The Library is having a video library equipped with four VCP and Video Display Units. It has a collection of more than one thousand Video cassettes. The library uses bar-code technology for computerized circulation system. Every book in the Library bear a bar-code tag that is used for its circulation. Similarly, all categories
of users have bar coded Patron cards. The library has developed in-house facility for bar-coding of books and Patron cards.

The LIBSYS software is being installed on WINDOWS NT Server. The salient features of this package, for each of the library activities, are summarised as follows –

Acquisition: Maximum 3 reviewers can be given. While in procurement or the update title screen the ‘Recommend’ button can be activated to specify the reviewers’ names. They are reflected in reports.

The system provides options for serial numbers continuous just by specifying yes/no, e.g. if marked y and proceed with approval process by including say 12 titles in an approval number and say another 7 titles in the subsequent number. Now if these two approval forms are generated the first one would contain the titles serially arranged from numbers 1-12 and next one would start the number from 13-19. On negating this option the form can have the numbers 1-7. On checking the setup in the existing field ‘20’ would be displayed which reflects that the next approval form generated would start with serial no. 20. By typing a number say 25 the form can start from this fresh number.

Duplicate check is done irrespective of the type of document selected. The title field can contain the first few words of the title and if those first-words exist in any of the titles, all of them and if those first words exist in any of the titles, all of them would be listed. System scans the bibliographic database to check if the title already exists. Besides catalogued titles, other titles which are in different stages of acquisition are also scanned during the check. The screen displays all the titles which match with the few words which have been typed in the title field. At the bottom of the screen the following options can be seen –
New Title Edit select Acq-Dtls Dtls Quit Please Increase space on dots If the title entered in the title field is to be treated as a fresh title ‘New’ button can be clicked. A new entry is initiated and the bibliographic screen appears. This title can have a duplicate or no duplicate. ‘Edit’ option is exercised when a title already existing but with a different edition is to be entered. To enter a fresh edition of title already existing, select/highlight the title first and then click the edit button. This results in copying all the bibliographic details of the selected title to create a new bibliographic record and then allows changes to be made in the respective fields for the new edition. Under this option, a new title entry is initiated in the database.

‘Select’ option enables the selection of an existing entry and ordering for additional copies. After selecting the title on clicking ‘Select’ option the procurement worksheet opens. The bibliographic data remains the same. By clicking ‘Acquisition Details’ option, if a title is active in acquisition, its procurement details such as order, date etc. can be seen. Before selecting any of the options given, there is a facility to see the catalogue card of the title selected from the list by highlighting the title and clicking on ‘Details’ option. If the card continues in two screens then there is one option to view the previous card and continuation on next card. In order to view the details of the next title ‘Nxt Ttl’ option is used. ‘Cps’ is used to view the copies of the title on screen. Members of the Library can make a request for acquisition of new titles from OPAC. LIBSYS provides an interface to transfer such requests to the Acquisition system. Bibliographic data may also be loaded directly into the Acquisition System by the ‘Data Import’ facility provided by LIBSYS. Data is down loaded from CD-ROMs or on-line bibliographic databases both in MARC and non-MARC formats. In case the details of books are to be downloaded from the internet then ‘Networking Downloading’ option is used. The ISBN of the books, whose details are to be downloaded, and the name of the server, where the book details reside has to be given. The server, being accessed, should give the download facility to the users.
Vendors' data, available in a format which can be converted into text format, can be easily imported into LIBSYS. The text file must be copied into the workfile path before the import. The file name or Input file and any name in the Record structure file field has to be mentioned. Record structure has to be defined. The size of each field to be imported and also the field sequence has to be given. The total of all the field-size + 1 would be typed in record size field. The order form has an option of sending it directly to the vendor through e-mail if the address is specified while entering the vendor's details and checked the use e-mail.

Cataloguing:

LIBSYS supports different bibliographic formats for various types of documents. Some of these are: Books; Conference proceedings; serial books; Reports; Standards; Charts/Maps; Micro documents; Theses; Patents; Manuscripts; Articles; Preprints; Reprints; Photographs; Photocopies; Films; Videotapes; Audio-tapes; CDs. 'Globan Changes' function facilitates replacement of a word or phrase in any field of a type of Document throughout the database. The change would occur in the entire database.

If replacement is to be done in all fields then check this field or else select the codes of the fields in which changes have to be made. The existing text and the text by which replacement has to be done are to be typed.

The types of documents being created in LIBSYS will automatically get listed along with their description and format Ids (Identifications). Valid levels, for the purpose of maintaining confidentiality of documents, can be defined and can be associated with each title. If the types of documents defined are to be treated as separate databases for the retrieval (OPAC) purpose then they must be named. Maximum of 9 databases can be created. Each database can have different
catalogue names which can be set. After defining the types of documents, for each predefined bibliographical format provided by LIBSYS, following should be specified:

Searchable fields in Boolean Searches (With option to index the full field or words in the field).

Author Index
Fields to be indexed (tags/codes).
Fields to be displayed in the brief list of Author catalogue (tags/codes).

Title Index
Fields to be indexed (tags/codes)
Fields to be displayed in the brief list of Title catalogue (tags/codes).

Classified Index

Is it to be implemented?
Fields to be displayed in the brief list of classified catalogue (tags/codes).

Subject Index

Is it to be implemented?
Fields to be displayed in the brief list of Titles of a Subject catalogue (tags/coes).

Keywords Index (of all the searchable fields)

Is it to be implemented?
Fields is to be displayed in the brief list of the Search results (tags/codes).
Database Number (From ‘1’ to ‘9’ as defined in the Document Formats function).
Fixed attributes to be included in card display?
Define following fields (by indicating corresponding tag/code).

Year of publication.
Series.
Notes.
ISBN.
Class Number.
Place.
Publisher.
On selection of this function, the system displays the various format IDs. The
cursor is to be brought against the format for which the above parameters are to be
changed before pressing ‘Enter’. On selection of a specific format. ID, the system
displays the existing values of the above parameters and accepts changes in the
same. At this stage, the description of various fields can be seen by pressing codes
description. On pressing this following additional parameters can be specified -

Default card format (A = AACR-2; M = Mnemonic based; U = User defined).

Is sub-title field present? (Y/N), on entering required changes in the parameters,
press enter to update the database.

‘Set Database Access’ function is used to define access to different databases for
different categories of the members of the Library whose records are maintained in
the ‘Circulation’ system. For the purpose of sorting the title indices, words that have to be ignored should be defined through parameters ‘Define Articles’. They are defaulted to ‘A’, ‘AN’ and ‘THE’. Stopwords other than these can be defined here.

‘Accented Characters’ value should be defined alongwith the normal value of the alphabet so that when the ASCII file is sorted for indexing, the entries may appear together. For Current Awareness Services the documents acquired through the Acquisition System are tagged automatically at the time of cataloguing to a ‘New Additions’ File. The entries created directly through the Cataloguing System, may also be tagged automatically to the same file. The ‘New Additions’ entries can either be browsed in OPAC or can be used for monthly, quarterly or any periodic generation of a list of ‘New Additions’ to the Library. The entries in the list can be arranged in any one of the following orders:

Subject heading or keyword
Classified by code and subject.
Alphabetical.

Following functions are available for maintaining the ‘New Additions’ file:

List New Additions
Update New Additions List
New Additions Check List
New Additions List
Develop File
Bibliography
Remove file
Special bibliographies can be generated by accessing various on-line catalogues. The list may be arranged in any of the following orders:

- Subject heading or keyword
- Classification number with corresponding subject.
- Alphabetical arrangement by author/title.

_Circulation:_

To set up a circulation system in LIBSYS, members’ details like Registration Period, Regn. Expiry Notice Period, Regn. Renewal Period, Address and Name of Member, Group, Subject and Sex of Member, Identity card no. of students and sign of Identity of staff are provided on the worksheet. In the next worksheet, parameters of check-out/Renewal like maximum number of documents to be issued to a particular category of member, duration for which a type of document can be issued to a particular category of user, maximum renewals allowed, maximum reservations and category for late fines etc. have to be provided. When there is a set of documents meant for only a cadre of members then the option of ‘Special Material Category’ can be activated as follows:

In cataloguing a document category say ‘S’ is being created. For the titles already entered, the holding can be updated and category can be changed to ‘S’. For new entries, while accessioning, the category can be specified as ‘S’. In circulation a member category say ‘Special’ is being created and ‘Any privilege say Y’ is recorded at the time of Registration e.g. the category of member say Scientist or Teaching faculty and additional category as ‘special’. Once the check-out is processed the same title with its other details can be transferred into cataloguing module by activating transfer circulation titles option in the House keeping function of circulation.
Every Transaction taking place from the circulation module is recorded as a separate entry and stored in a log file. Transaction log can be generated from enquiries and print-out of the same can be obtained from the reports. In Transaction log file cut-off transaction date and time has to be given. A print-out of transaction log can be generated for record purposes.

*Serial Control:*

The worksheet/screen would require inputs like Title, Name of Publisher with address, Subscription amount, Delivery mode, Volume and Issue details, copies, Name and Address of Vendor, if any, Budget head, Date of receiving 1st issue, Expected date of next issue etc. Unless any one of the following options is chosen, Kardex can not be done. The table below describes the kind of control a journal comes with and the corresponding options to be used –

<table>
<thead>
<tr>
<th>Journal</th>
<th>Options to be used</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volume No. only</td>
<td>Vol.</td>
</tr>
<tr>
<td>Issue No. only</td>
<td>Issue</td>
</tr>
<tr>
<td>Volume No. and Issue No. both</td>
<td>Vol. Issue</td>
</tr>
<tr>
<td>No Volume and Issue Nos. only period</td>
<td>Period</td>
</tr>
<tr>
<td>Issue No. and Year</td>
<td>ISS-Yr.</td>
</tr>
</tbody>
</table>

In case the journal’s subscription begins from April and ends in March the field ‘Vol.’ Overlap with pervious year’ has to be checked (set as ‘Y’). In case of packet subscription where 4-5 or more journals are being received as one set from a vendor then set no. can be specified. If two journals, e.g. Computer Today and PC Quest are being procured a set from CAN then the details of Computer Today are entered and set no. 1 is given to this. Again from PC Quest details are entered
and set no. 1 is given to that also. These both will be invoiced together with a set price. There is a provision to enter upto 9 sets from a single vendor.

S.D.I.:

Selective Dissemination of Information (S.D.I.) is generated taking into consideration of interests of the members. In the 1st step a list of subjects/strategies on which articles are majorly present in the library is being developed. A numeric or an alphanumeric code followed by the description of the subject is given. In the 2nd step the Interest Profile of the Members (Users’ Interest Profile) is being created by selecting the codes of subject of his/her interest from the list. The 3rd step can either be started by developing a file with range of records or simply continued and giving the range of Member Identification for whom S.D.I. has to be generated. The necessary details like the output filename, print, view file, range of records, in case file is not established, are being filed up.

The Library of IIT, Madras (Chennai) developed in house software and used ISQL and ORACLE. ISQL based on UNIX operating systems has been used for housekeeping routines like Acquisition, circulation, cataloguing and serial control Systems. Recently the Library has started using ORACLE for its computerization activities. For circulation system bar-code technology is being introduced. The Library has OPAC which is accessible in the whole campus of the Institute through LAN and Intranet. The Library is having Internet facility and all users, including students, can make use of it. The library provides CD-ROM Service and has 56 drives for CD net. It provides on-line services to its users. The library is reported to have more than one dozen of CD-ROMs. Video Viewing facility is available in the Library and it has more than 300 video cassettes.
The Library of IIT, Mumbai (Bombay) developed their software locally using FOXPRO on novel Nateware Platform. For serial control system efforts were made from 1982 to 1986 by Dr. (Mrs.) Date of Computer Sciences and Mrs. V.S. Subbarao, Head Periodical Section of Central Library to develop a software to be used on EC1030, a third generation system, but the results were not satisfactory. Therefore, a readymade software SLIM was installed in 1990 for serial control system. Library developed menu driven softwares PUSTAK AND PURTI. For circulation system Barcode technology is used. Library’s databases are available on Internet. The Library’s collection can be accessed through OPAC.

OPAC, the gateway to the Central Library resources is accessible 24 hours on Campus LAN. Database covering technical reports, standards and pamphlets is being created and available on LAN. The library has CD-ROM Networking System (CD-NET) with towers of 56 drives. The CD-ROM databases available in the library can be accessed round the clock on campus LAN. Some of the important collections of CD-ROM database are:

INSPEC on disk.

Engineering Index – Compendex – Plus.

Chemical Abstracts Surveyor.

Chemical Abstracts 12th Collective Index.

Dissertation Abstracts on disk.

Index to Scientific & Technical Proceedings (ISTP).

Powder Diffraction Files (PDF).

McGraw-Hill Concise Encyclopaedia of Technology.

Oxford English Dictionary.

Ullman’s Encyclopaedia of Industrial Technology-index.
To support the Academic and Research Activities of the Institute and members the following services are provided by the Library under its Reference Service –

“Ref-Alert” informs about the latest reference books acquired by the Library.

Readers are kept informed about the forthcoming National and International Conferences/Seminars.

Library compiles Bibliographies and Documentation Lists on special occasions.

Maintains the data relating to the employment opportunities available for scientists and engineers.

Through Video Viewing facility Educational films can be viewed by the students and staff.

Maintains a collection of booklets and handouts about the courses, scholarships and fellowships available.

Weekly display of books added to the Library. The list of displayed books is available on “MEHMAN”.

Articles and the notifications of the books, published by the faculty members, are displayed on the notice board.

“Lest you Miss” service keeps the users alert on the information appearing in the journals, newspapers, reports etc. received in the Library.
List of articles and news items of general interest on Science & Technology, collected from newspapers and journals, are displayed.

E-mail is available in all sections of the Library. E-mail is being used for:

Sending claims for books/journals’ issues not received.
 Queries regarding publishers’ price for journal subscription, books etc.

Queries regarding availability of new books, journals, monographs, conference proceedings etc.

**Inter-Library loan**

Current information service to faculty based on CCOD.

To inform users about books that have been urgently processed and are ready for issue.

Renewal notices with details of the book- an information service to faculty members.

The Library’s almost all the house-keeping routines viz. Book Acquisition, circulation control, serial control, cataloguing and indexing have been fully computerized. Information Storage and Retrieval services, provided by the Library, are CAS, SDI, Reference Services, Retrospective and on-line information services are provided by the Library.

Some important features of the software are as follows –

**Book – Acquisition**

Acquisition Data file is maintained which keeps a record of books received against Suggestions, books received on approval basis and books received as donations.
File has Bibliographical details like Author, Title, Subject, Imprint, Volumes/parts, collaborators, series etc. Funds allocation file to disclose the allocated amount for each individual deptt./subject. Order file includes all the orders processed. Reminder file to issue reminders for the books not supplied by the Publisher/Vendor.

Vendor’s file.
Accession Registers. file

**Serial Control:**
This software has following files:
Subscription file.
Vendor’s file.
Bill file – Payment – Fully/Partial.
Reminder file.
Processing file.
Record file.

**Circulation:**
The files and modules of circulation control system are as follows –
Users’ data file.
Books’ data file – Author, Title, Classwise, and keywords.
Issue record file.
Returned books’ file.
Overdue books file.
Overdue fine calculation.
Reservation of books.
No Dues checking and keeping record.
Data additions/modifications.
Lost books’ process.
Statistical report generation.
Know your Library – Pamphlet.
Library Rules.
Daily breakup of charging/discharging etc.
Status of book.
Number of books issued to users.
Daily transactions – According to Accession number, users, subjectwise, Departmentwise.

Stock verification Data file etc.

**PUSTAK:**
It is a menu-driven, modular, user friendly PC/AT based system, designed for the use of the circulation function of the Central Library. No prior knowledge of any programming language is assumed on the part of user. However, user has to be reasonably familiar with the PC/AT i.e. how to put it on, how to shut it off, insert a floppy, and how to enter data when presented with a screen form. As part of its housekeeping, menu driven backing up of books, data is provided from Winchester to a 1.2 MB capacity floppies. The following description introduces how to invoke the system; choose a menu, invoke it; choose a submenu, invoke that, and get the desired output. The user should remember, that output from any system is as accurate as the input that goes in i.e. inaccurate input will produce garbage output. Therefore, it is imperative that when in doubt, the user should consult the manual, the programmer, or the associated library staff, before entering data.
To invoke or start the PUSTAK system first put the power on then system ON and then monitor ON, insert the floppy and allow the system to boot. After a very short time ‘PUSTAK MAIN MENU’ appears on screen. The ‘PUSTAK MAIN MENU’ allows to do the following –

1- Entry of data.
2- Modification of existing data.
3- Printing of various data.
4- Browsing through data.
5- Processing issues, returns, claims, overdue books, fines etc.
6- Backing up of books data, i.e. the computer catalogue.
7- Quit.

The ‘PUSTAK’ system defines 3 main types of data, viz. Books Data, Users’/Borrowers’ Data and Claims Data. The data is keyed in essentially by the user, as opposed to other data like issue records, overdue books data etc. that is generated by the system from time to time. The data entry is of only the primary data i.e. the books, users and claims. Modification, browsing and printing options of the main menu again pertain to operations on this primary data. Once all primary type data is entered, the users may proceed with issuing books and processing their subsequent returns etc. The users must option 5 for this purpose. All the various operations that can be done are indicated by a number that describes the option. The options 1 to 7 are listed above with their descriptions e.g. 1 for data entry and 3 for printing the data. After choosing the desired option ENTER has to be pressed. This will take the user to the desired sub-menu.

*Data Entry Sub-menu*: This sub-menu allows data entry of two types of data, viz. Books and Borrowers. For entering the data of books first the Accession number
has to be entered correctly which displays a form. The various fields have to be filled in the following manner –

The title has to be keyed in. Maximum size of this field is 250 characters. Next a maximum of 3 Authors may be specified for a book. For a given author the entry format is: last name, initials. ‘ENTER’ has to be pressed after each field and also after entering the name of each author. Next the year of Publication has to be keyed in. The Publisher’s details have to entered in the format: Publisher’s name, place, year. The Collation refers to information about no. of volumes, pagination, size etc. This may be entered in any order. The classification used in IIT, Mumbai Library is Universal Decimal Classification scheme (UDC) and the class no. assigned to the book has to be keyed in. After entering all information on the screen form ‘ENTER’ has to be pressed. The system now writes all this information on disk and then ask for the next Accession number. After entering all the Accession number option 3 is to be pressed which brings the user back to Pustak Main menu. By pressing option 2 and ‘ENTER’ the user can again start data entry.

For data entry of user (Borrower) we have to press option 2 of data entry sub menu. The system will prompt to the Borrower’s code which is being assigned to every borrower of the Library. By Typing the Borrower’s code the screen shows the from which has a user code (6 digit numeric code), Name of the user (upto 30 characters), Name of Department (Upto 5 characters) in standard abbreviated form, category (If the books is to be issued for a period of 30 days enter the number of days in numeral and if till semester enter φ as category, number of Books allowed (It is, at maximum, a number of 2 digits e.g. for faculty 15 books which is to be entered as φ and for Director/Chairman/Board of Governors where the number is unlimited enter as 99), and at the end cumulative fine which is being
entered automatically by the system as and when a book is returned after the due date.

Modification Sub-menu :- This sub-menu can be invoked by choosing option 2 of PUSTAK main menu. This sub-menu allows to Modify Existing Data. Whenever a change is desired in the data already entered this sub-menu has to be invoked. This sub-menu offers 3 choices viz. For modification of data of books choose 1 of this sub-menu; for modification of data of Borrowers choose 2 of this sub-menu; and for modification of claims data choose 3. To modify the data of book after pressing 1 and ENTER the concerned Accession no. is to be keyed-in. This brings form on screen and we may navigate through the form by bringing cursor to the field where data has to be modified. After modifying the data option 4 of the sub-menu is used to exit from sub-menu and reach to the PUSTAK main menu. For the modification in user’s data option 2 of the modification sub-menu has to be selected. The next step is entering the Borrower’s code (a six digit numeric code). Now the screen displays form of user’s data and by bringing cursor to the field where modification has to be done the desired modifications can be made. By pressing ENTER on the last field the modifications for the particular user’s code is completed and the information is transferred on disk. Now the system prompts for another user’s code and the same procedure is repeated. If user’s code is entered as ZZZZZZ or option 4 is selected the system allows to exit from this modification sub-menu and brings back to PUSTAK main menu.

For modifications in claims data, option 3 of the modification sub-menu has to be selected followed by pressing ENTER. In case of claims the main difference, from other two modifications is that, there may a number of claims on one book. This means that whole claim record for that book has to be looked in to find that in which particular data modifications have to be made. The first query is about the Accession number. On keying-in this data the screen presents the total record of
claimants for that Accession number. Now by bringing cursor to the claimants concerned. The desired modifications can be made. An entry of Accession no. zzzzzzzz takes us back to the modification sub-menu. By keying -in QUIT the system brings you back to PUSTAK main menu.

Printing of data sub-menu : This sub-menu of ‘PUSTAK’ may be invoked by selecting option 3 of main menu. This submenu offers 3 choices i.e. “1” for printing the data of book, ‘2’ for printing the data of user, and ‘3’ for printing the data of claims. For printing of book data after selecting option ‘1’ of this sub-menu and then pressing the beginning accession number and the last accession number if a selective print out is desired. And if print out is desired from is beginning the to the end just press ‘ENTER’ after selecting the option ‘1’. This will give a complete print out from smallest number to the largest accession number. For printing of Borrower’s data select option 2 of this sub-menu and then key-in the Borrower’s code and ‘ENTER’. This will give a print out of concerned Borrower’s data. For printing the data of claims option 3 of this sub-menu has to be selected and then the Borrower’s code has to be key-in to get the claims data print-out. By entering QUIT the system takes us back to the ‘PUSTAK’ main menu.

Browse sub-menu :- This submenu of PUSTAK may be invoked by selecting option ‘4’ of the main menu. This sub-menu also offers 3 choices – ‘1’ for Browsing book data, ‘2’ for browsing user (Borrower) data and ‘3’ for browsing the claim data. For browsing the book data after selecting ‘1’ of this sub-menu enter the beginning string of title words (when exact title is not known) and the screen will shows all the titles having the given string of words. If no such title exists then the system ask for another string. When browsing is over ‘ESC’ key is to be pressed. For Browsing the Borrower’s data after selecting option ‘2’ of this sub-menu enter the name of the user. This gives name and other details of the
Borrowers with their codes. After browsing under one name, if the system puts a query whether browsing is finished? If the answer is ‘N’ then it allows to enter another name. To come out of this sub-menu press ‘QUIT’ and system is back to PUSTAK main menu. For browsing the claims data after selecting option ‘3’ of this sub-menu the desired accession number has to be keyed – in and whole process is same as described under modification of data sub-menu for claims data.

Circulation Sub-menu: This sub-menu takes care of Issues, Returns, claims, Fines and overdue books. This is the most frequently used sub-system of PUSTAK. The circulation sub-menu may be invoked by selecting option 5 of the PUSTAK main menu. The following functions are possible through circulation sub-menu –

1. Issuing a book.
3. Enter/Delete Claims.
4. Scan for Overdue books.
6. Quit or Exit from sub-menu.

For Issuing a book option 1 of this sub-menu is selected. The system asks to enter an accession number and a borrower’s code. The system checks the validity of entered accession no. and borrower’s code. If the accession no. is wrong or the book is already issued or under claim such information will be displayed on screen. If the borrower’s code and accession number both are valid then Borrower’s details are displayed on screen. These will pertain to the name of borrower, the number of books allowed, the number of books already issued, the department etc. If the Borrower’s details tally type ‘Y’ and if not then type ‘N’. If Borrower’s details are O.K. The system displays Book details. The counter staff has to tally the Book details on screen and physically on book. If tallied the Books
is issued to the borrower and the accession no. will be displayed in issue records. Issue of the books is prohibited if the book details do not tally. In the issue record all the details except one are already filled in. The only one detail to be filled in is the ‘SCHEME’ under which books is issued e.g. Technology Lending Library (TLL), Backward Collection (BC) etc. This detail is to be filled in only if the books is being issued under any special scheme. In case of general issue this detail is not to be filled and only ‘ENTER’ is pressed with the cursor in the ‘SCHEME’ field. The expected return date or due date for the book is calculated by the system taking into consideration, the borrower’s category and the ‘SCHEME’, so where a scheme is relevant it must be filed in. After completion of issue process for one books the system puts a query as to whether any other issues are there. If more books are to be issued answer ‘Y’ and repeat whole process for issuing another book. The answer ‘N’ takes back to circulation sub-menu. The other mode to exit from issue module is to enter Borrower’s code as ZZZZZZ and pressing blanks for accession number. This returns us to the circulation sub-menu.

For Returning of books option ‘2’ of the circulation sub-menu has to be selected. The Accession number of book, to be returned, has to be entered and followed by entering Borrower’s code. The system checks these details from the details on file. If the details tally the issue record is displayed on the screen and the return of the book is processed. The relevant issue record is then obliterated from the computer files. If anymore books are to be returned choose ‘Y’ and if not then press ‘N’. For entering of claims, option ‘3’ of circulation sub-menu has to be selected. It is a must to enter the Borrowers’ claims on computer files so that they may be considered when the book is due for another issue. After selecting option ‘3’, the accession number of the claimed book has to be keyed-in and the system then displays the book details on the screen. If the book details are tallying then the Borrower’s code is entered. When Books details and user code tally, the claim is entered onto the computer files and further claims may be processed by typing Y,
when the system asks if any more claims to be processed. By typing ‘N’ to the
query the system takes back to the circulation sub-menu. To scan for overdue
books option ‘4’ of the circulation sub-menu has to be selected. The system almost
immediately start calculating the overdue and the associated fines The fines will
be indicated in the Borrower’s record maintained separately – on the system.
When the Borrower has more than one book overdue then the Borrower’s record
will indicate the cumulative fine amount.

For processing payments of fines option ‘5’ of the circulation sub-menu has to be
selected. Fines for the concerned Borrower are part of the Borrower’s Record on
the computer files. Whenever a fine payment is made the system ask for
Borrower’s code. If this code is valid then the system displays Borrower’s details
such a Name, Department of Borrower, and the total fine outstanding in the
Borrower’s name. Here the Borrower pays fine at Cash Counter and obtains a
receipt for the amount paid. Then the date of payment, the receipt number and
amount has to be entered. If the amount of payment is not equal to the amount of
fines listed on Borrower’s record, the balance of the fine to be paid is indicated in
the Borrower’s record. On pressing ‘ENTER’ the system asks for the next
Borrowers’ code. An entry of Borrower’s code – zzzzzz followed by a ‘return’
will bring back to the circulation sub-menu.

**Serial Control:**

The worksheet/screen would require inputs like Title, Name of Publisher with
address, Subscription amount, Delivery mode, Volume and Issue details, copies,
Name and Address of Vendor, if any, Budget head, Date of receiving Ist issue,
Expected date of next issue etc. The receipt control field is of prime importance.
Unless any one of the following options is chosen, Kardex can not be done. The
table below describes the kind of control a journal comes with and the
corresponding options to be used –
Journal Options to be used
Volume No. only Vol.
Volume No. and Issue No. both Vol. Issue
No Volume and Issue Nos. only period Iss Yr.

In case the journal’s subscription begins from April and ends in March the field ‘Vol. Overlap with previous year has to be checked (set as ‘Y’). In case of packet subscription where 4-5 or more journals are being received as one set from a vendor then set no. can be specified. If two journals, e.g. Computer Today and PC Quest are being procured as a set from CAN then the details of Computer Today are entered and set no. 1 is given to this. Again from PC Quest details are entered and set no. 1 is given to that also. These both will be invoiced together with a set price. There is a provision to enter upto 9 sets from a single vendor.

S.D.I. :
Selective Dissemination of Information (S.D.I.) is generated taking into consideration of interests of the members. In the 1st step a list of subjects/strategies on which articles are majorly present in the library is being developed. A numeric or an alphanumeric code followed by the description of the subject is given. In the 2nd step the Interest Profile of the Members (Users’ Interest Profile) is being created by selecting the codes of subject of his/her interest from the list. The 3rd step can either be started by developing a file with range of records or simply continued and giving the range of Member Identification for whom S.D.I. has to be generated. The necessary details like the output filename, print, view file, range of records, in case file is not established, are being filled.

The library of IIT, Madras (Chennai) developed in house software and used ISQL and ORACLE. ISQL based on UNIX operating systems has been used for house-
keeping routines like Acquisition, circulation, cataloguing and serial control Systems. Recently the Library has started using ORACLE for its computerization activities. For circulation systems bar-code technology is being introduced. The Library has OPAC which is accessible in the whole campus of the Institute through LAN and Intranet. The Library is having Internet facility and all users, including students, can make use of it. The Library provides CD-ROM Service and has 56 drives for CD net. It provides on – line of Borrower, and the total fine outstanding in the Borrower’s name. Hence the Borrower pays fine at Cash Counter and obtains a receipt for the amount paid. Then the date of payment, the receipt number and amount has to be entered. If the amount of payment is not equal to the amount of fines listed on Borrower’s record, the balance of fine to be paid is indicated in the Borrower’s record. On pressing ‘ENTER’ the systems asks for the next Borrower’s code. An entry of Borrower’s code – zzzzzz followed by a return’ will bring back to the circulation sub-menu.

Quit Sub menu : To come out of the circulation sub-menu option 6 has to be selected and ‘ENTER’ is pressed.

USING BARCODE FOR CIRCULATION : The Barcode Technology was introduced in the Library of IIT, Mumbai in August 1991. Learning from the experience elsewhere was not possible as no information on the use of the Technology in a library, particularly of the size of IIT, was available. In fact the Library of IIT, Mumbai was a pioneer to use Barcode Technology. It is worth mentioning here that ever since its introduction the Technology has never failed and has been yielding the desired results. As discussed in the preceding pages the Library of IIT, Mumbai computerized its circulation by using an in-house developed software PUSTAK, but due to heavy transactions per day and still heavier load of circulation during examinations and peak hours of the day it was found very difficult to manage the circulation. The computerization of circulation
function was based on the digits making up the accession number on one hand and borrower's code on other. At the time of each transaction it was these digits that had to be keyed in. For example, a faculty member, entitled to borrow 15 books, returns 15 books and borrows another 15 books and if the accession number of the book consists of 6 digits and the borrower's code consists of 8 digits, the number of digits that the staff at the circulation counter had to key-in was 8+15x6+15x6=188. All these digits had to be keyed in without any error, in the face of a possible disturbance from an often impatient reader across the counter. The minimum number of digits to be keyed in was 6 if the reader returned only one book. The probability of error in keying in the number was no doubt very high. Added to it was the time taken in keying in these many digits. The need for accuracy was very essential. It was, therefore, found necessary to adopt the Technology that would not only achieves the required speed but also ensure the accuracy. Barcoding was the answer.

Barcode is a series of black bars of varying breadths and white spaces between every two of them. The bars and spaces represent a series of characters or digits. These barcodes are readable only by a scanner which sends messages to the Computer that decodifies the numbers of the digits. The computer identifies such bars as '0s' and '1's and white blanks as 'offs' or 'on's. Therefore a barcode is a series of '0's and '1's representing characters or digits in such a form as only the computer can identify. To use Barcode Technology it is essential that each book or an issuable item in the library is attached with a Barcode. The Barcode needs to be printed with almost precision and pasted on a surface which is absolutely plain. It is also necessary to attach Barcode to readers' tickets in the same manner. The barcodes are read either by a ward or by a Laser scanner.

ISSUE OF BOOKS :- The borrower presents his/her Barcoded ticket alongwith the book/s. The library staff after going in for the Issue-of Book-Menu scans the
borrower’s ticket and opens the borrower’s account. The staff then scans the Barcode of book/s with the scanner. Each book thus gets automatically added to the borrower’s account.

Return of Books :- To return the books to the library the borrower presents them at the counter. The staff goes in for the Return-of-Book-Menu to record the return of the book. The staff scans the barcodes of books which again automatically gets fed to computer and the books are cancelled from the issue record. (For returning books borrower’s ticket is not necessary). The whole transaction of returning 5 books and getting 5 books issued at the same time takes only 2 minutes. The Technology proved to be advantageous in two more ways. Firstly, its high level accuracy could win the faith of its beneficiaries very soon not only in this Technology but also in the total process of computerisation. Secondly, the introduction of the Technology was received as something ‘great’ especially by the younger generation. The students felt ‘proud of their library’ because of the most modern technology being used in it.

In the implementation of the Technology there are managerial, administrative and financial problems. In case of IIT, Mumbai availability of funds and support from the authorities was no problem but the managerial problem was very big. The crucial issues were –

a) This was to be done with minimum interruption in the circulation service.

b) It had to be ensured that the new accessions would be Barcoded during the period the when the project was on.

c) It had to be seen that after this operation was over the barcoding functions would be integrated into the routine-activities of the library so that the barcoding of the new books as well as of the tickets of new members would be continuously done.
d) Provision was to be made for generating and providing barcodes for the existing books and borrower’s tickets, in case they got soiled, lost or incorrectly printed.

To begin with, a pilot project was implemented taking 500 books belonging the subject Library & Information science and 70 library staff had been barcoded and used successfully. For barcoding of books the alternative strategies were – By accession number, by class number, in shelf list order, Barcoding Individual Books at Hand and moving the machine along the rack. Of these alternatives, the Barcoding Individual Books at Hand was finally selected and adopted as it offered least disturbance in the normal working of the library. Monitoring the operation was easier and the chances of a chaotic situation developing in the library were almost nil. For generating Barcodes of the borrowers it was decided to use the Employee code number in the case of staff and the Roll number in the case of students, both of 8 digits. These 8 digit codes were not expected to be in conflict with the 6-digit accession numbers. Besides, the 6-digit limit of accession numbers is not likely to change for at least another twenty years.

Need of the Project and its design – The barcoding of 2,40,000 bibliographic items and over 6,000 reader’s cards was obviously an additional work for the library. It could not be done by stretching the existing resources of the library. Additional provision had to be made for man power, material and machines. It was necessary to design a time bound programme to complete the operation. It was also essential that during this operation normal work of library should not get affected. Due to these reasons it was a must to take this allocation as a project by itself. The designing of project was based on the following decisions for successful completion of the project.
a) Generating the barcodes and pasting them on each item must be done simultaneously. The book would be retained in the work station as long as it is required for generating its barcode and pasting it.

b) Each book would have the barcode at two places, so that if one gets soiled the other would be available for laser scanning.

c) Books would not be retained for the purpose for more than one working day.

d) The books which are being returned by the readers would be bar coded on priority basis.

e) Small workstations would be set up where generation of barcodes and their pasting would be done. The books would be transported to this workstation.

f) It was to be taken care that the transport of books would take less staff, time and energy and would not disturb readers and staff in the stack area.

g) To ensure accuracy in the barcodes, it was decided to do checking atleast four times during the procedure.

h) 1,000 volumes would be barcoded in a day.

i) The whole operation was to be completed within the period of 11 months.

j) It was decided that the Asstt. Librarian (circulation) would monitor the work for books and Asstt. Librarian (Periodicals) for the bound volumes of serials.

k) Following records would be maintained everyday –

   (i) Number of books brought to the workstations.

   (ii) Number of books entered for barcoding.

   (iii) Number of books for which barcodes generated.

   (iv) Number of books for which barcodes are pasted.

   (v) Number of books which have been sent back to stacks after barcoding.

   (vi) Stationery consumed.

   (vii) Computer consumables used.

   (viii) Stock provision of the consumables required for the next few days.

   (ix) Man power used during the project.
Staff: It was decided to employ four data entry operators and four attendants for the project. The staff required for other services in the operation would be drawn from the existing human resources of the library.

Hardware: Following hardware was made available for 11 months:

PC: Five (Four stand-alone for keying-in and one for printing).

Printers: Two (One was a stand-by to keep the work going undisturbed).

Laser Scanners: Two

Software: The software for generating barcode was supplied at cost by the vendor who supplied the scanners.

Operation Proper: The work started in February 1991. It was carried out on working days during the working hours. The personnel and book trolleys for transport of books from and to the work station were drawn from the central library. The books returned at the issue counter on the previous day were taken up first for barcoding. They used to be around 500. These books were treated during the first half of the day. In the second half, the books standing on shelves were being taken for barcoding. The books were first handed over to the data entry operators who entered the data (Acc. No., Author Title combination not exceeding 30 characters) and kept them in the same order as they were entered. After entering about 500 books, the barcode was generated. The barcodes were then pasted on respective books in an assembly manner and the books were kept in the same order as they were received at all stages. The completed lot would be carried the next day morning to the shelves. At this stage also the attendants would have a
quick glance to check whether the right barcode is attached to the book by quickly checking the author/Title and a accession number (also printed on the barcode) of the book. Throughout the period the average turnover of 1000 books/items was maintained and the project was completed in 10 months instead of estimated 11 months.

The only snag in the procedure was that the books in circulation which were to be barcoded on a priority basis irrespective of their classificatory order had to be transported to the workstation twice. But it was in-evitable. New books that were being added during the period of operation were treated as the books returned at the issue counter. Thus, the barcode for them got generated automatically and pasted. After the operation was over the work of generating the barcode was made a part of responsibility of technical processing section where the classification and cataloguing are done alongwith the pasting and writing of labels and book pockets. The section was given a PC and printer alongwith the software for printing barcodes.

The cost of barcoding, as estimated in 1991, worked out to be approx. Rs. 1.50 per item. The technology is performing well and is found satisfactory for both the readers and library staff. While greater efficiency is evident on the inner side of counter, an equal amount of satisfaction is visible on the other side. Another observation is that the barcode technology may not be cost-effective in small libraries with a small number of borrowers. It may be worth introducing in a library where integrated computer-aided library management is in operation. The total cost in that case would get distributed and benefits, however intangible they are, will get enhanced.

The library of IIT, Roorkee uses Windows NT, SCO Open Server (Unix), Novell Netwave, Window 95/98/Me/2000, MS/Office 2000 and Troodon Software for
various house keeping routines and information services. Through the details of Troodon software could not be provided by the respondent but it is reported that the software is working satisfactorily for last more than 3 years for various operations of library.

IIT, Bombay was a pioneer to use Barcode technology later other IITs like Delhi, Madras and Kanpur have also gone for Barcoding. The other IITs are also likely to go for using this technology in due course of time.

IIT, Kharagpur library is using Libsys software for acquisition, technical processing, circulation and OPAC. The details of this software are given under IIT, Delhi. It also offers Electronic SDI service to faculty. In the electronic library, databases can be searched on CD-ROM as well as on Hard disk. Facility of using Internet and Ernet available in the library.

IIT, Guwahati library is also using Libsys package for circulation, Acquisition, serial control and cataloguing. On-line Information Retrieval service and current awareness services are offered through LAN.

4.2.3- Humanware :- IIT, Kanpur central library has three system managers for proper maintenance and continuous development of IIT – KLAS. As for as operation part is concerned all the 33 technical staff members of varied designations are trained to operate the system. For book acquisition and technical processing they needed 12 staff members to manage it manually, but after computerisation only 3 staff members are managing all the jobs of both the sections. To manage circulation manually they required 14 persons but after computerisation only 6 persons are enough. Similarly the periodical section was managed manually by 09 persons and after computerisation only 04 persons are managing the section.
IIT, Delhi central library does not have any post like system manager/system analyst but one Dy. Librarian is Head of Computer Application Division. He is in-charge for computer-based library services, computer Hardware problems, Library Home Page, Web-based Library and On-line Public Access Catalogue (OPAC). Out of total 36 technical staff 27 are reported to be actively engaged in working with computers. Besides these time to time the library appoints number of operators on daily wages for data entry. 04 staff members are especially trained to manage OPAC.

IIT, Madras (Chennai) central library has 03 staff members to manage Book acquisition section, 03 staff members to manage technical processing section, 09 staff members to manage circulation section and 06 staff members to take care of work of periodical section. Since this library is in the transitional phase of computerisation, they failed to give the exact number of staff members actively engaged in computer applications.

IIT, Bombay (Mumbai) central library has employed 01 system manager and 6 data entry operators for computer applications and conversion of data into standard formate respectively. The existing ministerial staff (regular typist) were especially trained for data entry, data rectification of the data bases, and management of OPAC. Besides this, the technical/professional staff members have been trained to work on computers for their day to day work and to extend efficient and excellent services to their users. It is being reported that at present 06 staff members are working for books order section while prior to computer applications 08 persons had been working to manage the heavy work loads of acquisition section. Technical procession section, after computerisation of cataloguing, is running the show with 07 staff members. While manually they used to struggle, with ever increasing backlogs, for efficient functioning inspite of 09 staff members’ hard work. Now after computerisation and application of Barcode
technology the circulation section requires only two staff members at circulation desk at one time and thus only 04 persons needed for 12 hours’ working of circulation desk. Manually they had to deploy a minimum of 08 and maximum (during peak hours of rush) of 12 persons to do the same job. Similarly the management of periodical section (including circulation of periodicals) is now being managed by 09 persons only instead of 11 persons required for manual operations. Gradually the total 46 staff members (excluding peons, binders and xerox – operators) are trained to operate computers and do their assigned jobs with computer applications.

IIT, Kharagpur central library has 02 system managers to take care of computerisation of the library. Total 35 staff members are trained to work on computers out of 53. Hence they do not appoint any separate operators. The staff members are trained specially to consult OPAC, for e – mail and for searching electronic databases on CD-ROM and Hard Disk in electronic library. The library is fully computerized and actually 25 staff members are associated with working on computer system.