Chapter 3

ENGINEERING COLLEGE LIBRARIES IN ASSAM: AN OVERVIEW

3.1 Engineering Education in India

Technology and engineering are products of fundamental discoveries in basic sciences, and as is well known, these began to accumulate in the late nineteenth and in the twentieth century and in greater variety than in all the previous 50 centuries of civilized life. Inventive genius in Europe and America tried to utilize this science for new industries, and for other human needs. Thus new branches of engineering began to grow. Technical education plays a vital role in human resource development of the country by creating skilled manpower, enhancing industrial productivity and improving the quality of life.

Technical education plays a vital role in human resource development of the country by creating skilled manpower, enhancing industrial productivity and improving the quality of life. Technical education covers courses and programmes in Engineering, Technology, Management, Architecture, Pharmacy, Applied Arts and Crafts, Hotel Management and Catering Technology.

In India engineering is one of the preferred choices for good students at the 10+2 level. The competition for the top institutions is intense with students spending a lot of time and money in coaching classes to get the added advantage for the competitive entrance tests. This demand for engineering has resulted in a mushrooming of a large number of engineering colleges in the country. Despite this, the industry complains of an absence of trained quality engineers.

Engineering and technical education has always been one of the more sought after streams of higher education in India. Engineering education started in India with the first engineering college, the The College of Engineering, Guindy (CEG) in Chennai, India, is India's oldest engineering and technical institution, having been established in 1794. [Today it is one of the four constituent colleges of Anna University]. It was started in May 1794 as a School of Survey and established as a college in 1859 under the Madras University, and is one of the oldest technical institutes in the world.
Civil, mechanical and electrical are some of the oldest branches of engineering, while engineering education has evolved and diversified all the time with the latest driving force being IT and newer forays being biotech, water resources and disaster management. Post-independence starting from a mere 50 engineering colleges in 1950, this number stand at 1518 for the academic year 2006-2007 with a total annual intake of 5,69,283 students. In the year 2010-11, it became 3575 with a intake of 13,24,246 students.

India has the potential to be a global technology leader. The Indian economy has been growing at the rate of 9% per year. The Indian industry has also become globally competitive in several sectors and can increase its global market share. A critical factor in this will be the success of the technical education system in India.

Engineering education in India is broadly structured into three levels – at the initial level, Industrial Training Institutes (ITIs) offer certificate courses, then polytechnics offer three year diploma courses and finally engineering colleges, NITs, IITs offer graduate and higher degree courses in various engineering disciplines

### 3.11 Pre Independence

The whim for creation of centres of technical training came from the British rulers of India and it arose out of the necessity for the training of overseers for construction and maintenance of public buildings, roads, canals and ports and for the training of artisans and craftsmen for the use of instruments and apparatus needed for the army, the navy and the survey department. The superintending engineers were mostly recruited from Britain from the Cooper's Hill College and this applied as well to foremen and artificers; but this could not be done in the case of lower grades - craftsmen, artisans and sub-overseers who were recruited locally. As they were mostly illiterate, efficiency was low. The necessity to make them more efficient by giving them elementary lessons in reading, writing, arithmetic, geometry and mechanics, led to the establishment of industrial schools attached to Ordnance Factories and other engineering establishments.

While it is stated that such schools existed in Calcutta and Bombay as early as 1825, the first authentic account we have is that of an industrial school established at Guindy,
Madras, in 1842, attached to the Gun Carriage Factory there. A school for the training of overseers was known to exist in Poona in 1854.

The first engineering college was established in the Uttar Pradesh in 1847 for the training of Civil Engineers at Roorkee, which made use of the large workshops and public buildings there that were erected for the Upper Ganges Canal. The Roorkee College (or to give it its official name, the Thomason Engineering College) was never affiliated to any university but gave diplomas considered to be equivalent to degrees. In pursuance of the Government policy, three Engineering Colleges were opened by about 1856 in the three Presidencies. In Bengal, a College called the Calcutta College of Civil Engineering was opened at the Writers' Buildings in November 1856; the name was changed to Bengal Engineering College in 1857, and it was affiliated to the Calcutta University. It gave a licentiate course in Civil Engineering. In 1865 it was amalgamated with the Presidency College. Later, in 1880, it was detached from the Presidency College and shifted to its present quarters at Sibpur, occupying the premises and buildings belonging to the Bishop's College.

Proposals for having an Engineering College at Bombay city having failed for some reasons, the overseers' school at Poona eventually became the Poona College of Engineering and affiliated to the Bombay University in 1858. For a long time, this was the only College of Engineering in the Western Presidency. In the Madras Presidency, the industrial school attached to the Gun Carriage Factory became ultimately the Guindy College of Engineering and affiliated to the Madras University (1858).

The educational work in the three Colleges of Sibpur, Poona and Guindy has been more or less similar. They all had licentiate courses in civil engineering up to 1880, when they organised degree classes in this branch alone. After 1880, the demand for mechanical and electrical engineering was felt, but the three Engineering Colleges started only apprenticeship classes in these subjects. The Victoria Jubilee Technical Institute, which was started at Bombay in 1887, had as its objective the training of licentiates in Electrical, Mechanical and Textile Engineering. In 1915, the Indian Institute of Science, Bangalore, opened Electrical Engineering classes under Dr. Alfred
Hay and began to give certificates and associateships, the latter being regarded equivalent to a degree.

In Bengal, the leaders of the Swadeshi Movement organized in 1907 a National Council of Education which tried to organize a truly National University. Out of the many institutions it started, only the College of Engineering and Technology at Jadavpur had survived. It started granting diplomas in mechanical and engineering course in 1908 and in chemical engineering in 1921.

The Calcutta University Commission debated the pros and cons of the introduction of degree courses in mechanical and electrical engineering. One of the reasons cited from the recommendations of the Indian Industrial Commission (1915), under the Chairmanship of Sir Thomas (Holland) against the introduction of electrical engineering courses, is given in the following quotation from their report: "We have not specifically referred to the training of electrical engineers, because electrical manufactures have not yet been started in India, and there is only scope for the employment of men to do simple repair work, to take charge of the running of electrical machinery, and to manage and control hydroelectric and steam-operated stations. The men required for these three classes of work will be provided by the foregoing proposals for the training of the various grades required in mechanical engineering. They will have to acquire in addition, special experience in electrical matters, but, till this branch of engineering is developed on the constructional site, and the manufacture of electrical machinery taken in hand, the managers of electrical undertakings must train their own men, making such use as they can of the special facilities offered for instruction at the engineering colleges and the "Indian Institute of Science."

The credit of first starting degree classes in mechanical engineering, electrical engineering and metallurgy goes to the University of Banaras, thanks to the foresight of its great founder, Pt. Madan Mohan Malaviya (1917). About fifteen years later, in 1931-32, the Bengal Engineering College at Sibpur started mechanical and electrical engineering courses in 1935-36 and courses in metallurgy in 1939-40. Courses in these subjects were also introduced at Guindy and Poona about the same time.
Quite a number of engineering colleges have been started since August 15, 1947. It is due to the realisation that India has to become a great industrial country and would require a far larger number of engineers than could be supplied by the older institutions.

3.12 Post Independence
The first three years until 1950 were the years of planning and thereafter, the country entered into an era of establishment of national, state or regional and divisional level engineering institutions mainly for graduate courses. Slowly over a decade, transformation for post graduate engineering education set in.
After independence the Government of India implemented so many plans and schemes by which the country could develop in every sector and without proper emphasis on education it was not possible. Especially in development of industrial sector, there was a need to develop a sound technical education system. After achieving independence in 1947, the Indian government and the planners immediately realized the importance of developing engineering education in the country to ultimately build its infrastructure like industries, roads, dams, communication systems, power and energy etc.
So the Indian Government took step in this direction by establishing technical institutions, this resulted, so many technical institutions established in India. This was the foundation for improvement of overall quality of life of people and to raise the living standard of nation. The establishment and growth of these institutions is described as follows:

i. The Rising of IITs
In 1947, there were only around 38 engineering colleges with a total intake of 1850 students. In post-independence era, engineering education in India gained impetus with the establishment of the five Indian Institutes of Technology (IITs) in different part of the country. In 1945, the Sarkar Committee was appointed to suggest options for advanced technical education in India. The Committee recommended the establishment of higher technical institutes based on the Massachusetts Institute of Technology in the four regions of India. This resulted in the setting up of the five IITs. The IITs were created to train scientists and engineers, with the aim of developing a skilled workforce to support the economic and social development of India after independence in 1947.
The first Indian Institute of Technology was born in May 1950 in Kharagpur, West Bengal at the site of Hijli Detention Campus. Four other campuses were subsequently founded at Bombay (1958), Madras (1959), Kanpur (196) and Delhi (1961). In 1995 a sixth campus at Guwahati was added and in 2001 a seventh campus was established by upgrading Roorkee University, one of India’s oldest engineering institutions, into IIT. Even though Bombay is now know as Mumbai, the name of IIT Bombay remains unchanged and likewise although Madras is known as Chennai, the name IIT Madras remains unchanged.

To analysis and improvement in technical education, many committees were set up viz. Thacker Committee (1959-61), Nayudamma Committee (1986), P.Rama Rao Committee (1995), U.R.Rao Committee (2003) etc. The list of some major committees and their recommendations has been given in the following table.

### Summary of Major Committees and Recommendations (Table 3.1)

<table>
<thead>
<tr>
<th>Committee</th>
<th>Title</th>
<th>Year</th>
<th>Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Thacker Committee</td>
<td>Postgraduate Engineering Education and Research</td>
<td>1959-61</td>
<td>Funding for 100 Ph.Ds annually</td>
</tr>
<tr>
<td>3. R.A.Mashelkar Committee</td>
<td>Strategic Road Map for Academic Excellence of Future RECs</td>
<td>1998</td>
<td>*Conversion of RECs in NITs with the status of a Deemed to be University and structural changes in governance</td>
</tr>
<tr>
<td>4. U.R.Rao Committee</td>
<td>Revitalizing the Technical Education</td>
<td>2003</td>
<td>*Regional inequity to be removed, *Faculty shortage to be addressed, *Need for planning and coordination in the working of AICTE</td>
</tr>
<tr>
<td>5. P.Rama Rao Committee</td>
<td>IIT Review</td>
<td>2004</td>
<td>*Increase UG output of IITs, *Fund infrastructure increase, *Add new IITs but maintain quality</td>
</tr>
<tr>
<td>6. Kakodar Committee</td>
<td>NIT Review</td>
<td>2014</td>
<td>*NITs must deploy and upgrade the IT infrastructure facilities *NITs must also aim to engage industry in providing fresh inputs and greater support in the teaching learning process NITs should create and adopt the best practices</td>
</tr>
</tbody>
</table>
Few new IITs have been approved by the Govt. of India in 2008. The Government has approved the setting up eight new IITs in Bihar, Andhra Pradesh, Rajasthan, Orissa, Gujarat, Punjab, Himachal Pradesh and Madhya Pradesh at a total cost of Rs.6080 crores @ Rs.760 crore per IIT.

Some of the new IITs have taken undergraduate admission in 2008 but the students are housed on the campuses of other IITs. The IIT of Andhra Pradesh (Hyderabad), Bihar (Patna) and Gujarat (Gandhinagar) have commenced their session through IITs of Madras, Guwahati and Bombay respectively. The four IITs of Rajasthan (Jodhpur), Punjab (Ropar), Madhya Pradesh (Indore) and Orissa (Bhubaneswar) have commenced their classes in the campus of their mentor IITs at IIT Kanpur, IIT Delhi, IIT Bombay and IIT Kharagpur respectively.

From the academic session 2010-11, the IITs are a group of fifteen autonomous engineering and technology oriented institutes of higher education established and declared as Institute of National Importance by the Government of India. Each IIT is an autonomous university, linked to the others through a common IIT Council, which oversees their administration.

The latest addition to the IIT family is IIT BHU established in the year 2012 making the number of IITs in the list to 16 (sixteen).

A brief summary of IITs establishment, place and their mentor body is showing in Annexure I.

ii. The Rising of RECs

It was the dream of Pandit Jawaharlal Nehru to see India emerge as a leader in science and technology. In order to serve the growing demand for trained quality manpower, the Government of India started Regional Engineering Colleges (REC) in various parts of the country. During the second five year plan (1956-60) in India, a number of industrial projects were contemplated. To ensure enough supply of trained personnel to meet the demand for these projects, the decision was taken to start Regional Engineering Colleges (RECs) at the rate of one per each of the major state, which can churn out graduates with good engineering merit.

On the recommendations of the Engineering Personnel Committee (1955) Regional Engineering Colleges were established from 1959 onwards in each of the major states.
Each college was a joint and cooperative enterprise of the central government and the concerned state government. Annexure II A is screening the establishment of RECs in the different places of India.

Ten new NITs are coming-up and have been added into the Central Counseling from the year 2010. Like IITs, in the inaugural year of these NITs, a large part of the student intake is observed to be from the home state or territory which the respective NIT is located. The new NITs are shown in Annexure II B.

REC system served well but as time passed some state governments shown lack of responsibility to take them in right direction. Following the long standing demand for more IITs, it was decided to upgrade the RECs to National Institute of Technology (NIT). In 2003, all RECs were upgraded to NITs and central government took control to run these institutes. Now, NITs are autonomous institutions. In June 2007, the passing of National Institute of Technology Act, declared all NITs as Institutions of National Importance.

iii. Engineering Colleges in India (other than IITs & NITs)

The engineering colleges in India can be classified as

- Affiliated Colleges
- Autonomous Colleges/Universities
- Deemed University

In the case of affiliated colleges, the institution is affiliated to a university, which is the degree granting body. The college has no flexibility or powers related to curriculum or evaluation. The academic powers rest with the university. In the case of autonomous colleges, the institutions have academic flexibility viz they can make curriculum changes and conduct examinations and evaluation. However, they are notionally under the university and have relatively less financial autonomy. Institutions that have acquired deemed university status have maximum academic and financial autonomy. In India, most of the colleges are affiliated.

In India, apart from IITs & NITs there are several other state government run engineering colleges that have an established reputation. These colleges are affiliated with different universities. Besides, there are a huge number of private engineering colleges in India and about seventy five percent engineering graduates are taught in the
private engineering colleges. At present more than 1300 private engineering colleges are running various disciplines of engineering with modern equipped facilities and curriculum. Maximum private engineering colleges are affiliated by university and some deemed universities also providing engineering education.

**Overall Status of Engineering Colleges in India**

At present in India, there are 16 IITs, 30 NITs and more than 3575 degree engineering colleges (2010-11). Out of these, 20 - 25% is government engineering colleges and rest of the colleges are managed by private sector. (Singh, 2013)

The growth of engineering colleges in India, other than IITs and NITs reflecting in the following Table

**Growth of Engineering Colleges in India and annual intake (Table-3.2)**

<table>
<thead>
<tr>
<th>Year</th>
<th>Engineering Colleges</th>
<th>Intake</th>
</tr>
</thead>
<tbody>
<tr>
<td>1950</td>
<td>50</td>
<td>3700</td>
</tr>
<tr>
<td>1960</td>
<td>110</td>
<td>16000</td>
</tr>
<tr>
<td>1970</td>
<td>145</td>
<td>18200</td>
</tr>
<tr>
<td>1980</td>
<td>158</td>
<td>28500</td>
</tr>
<tr>
<td>1990</td>
<td>337</td>
<td>68600</td>
</tr>
<tr>
<td>2000</td>
<td>778</td>
<td>185036</td>
</tr>
<tr>
<td>2010</td>
<td>3575</td>
<td>1324246</td>
</tr>
</tbody>
</table>

**Fig: 3.1: Growth of Engineering Colleges in India and annual intake**

![Graph showing growth of engineering colleges in India from 1950 to 2010](image-url)
Growth of Engineering Colleges in India and annual intake Last 5 years (Table 3.3)

<table>
<thead>
<tr>
<th>Year</th>
<th>Annual Intake</th>
<th>Total Intake</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006-07</td>
<td>1511</td>
<td>550986</td>
</tr>
<tr>
<td>2007-08</td>
<td>1668</td>
<td>653290</td>
</tr>
<tr>
<td>2008-09</td>
<td>2388</td>
<td>841018</td>
</tr>
<tr>
<td>2009-10</td>
<td>2942</td>
<td>1071896</td>
</tr>
<tr>
<td>2010-11</td>
<td>3575</td>
<td>1324246</td>
</tr>
</tbody>
</table>

Fig: 3.2 : Line graph of growth in Last 5 years


3.2 Engineering Education in Assam

The growth of Technical Institutions in Assam had been very dismal and gloomy before independence. The first and second Technical Institutes in Assam were established, respectively, in 1920 (Govt. Weaving Institute at Guwahati) and 1927 (His Royal Highness the Prince of Wales Technical School at Jorhat) under the administrative control of Department of Industries. Both these Institutes offered only certificate courses on Weaving, Mechanical Apprenticeship, Carpentry & Wood working, and Junior Motor Mechanic. At that time there was no such Institute in the entire Assam even for a diploma course. The first diploma Institute in Assam was established after independence in 1948 with the name of Assam Engineering Institute.
(AEI) at Chandmari, Guwahati and subsequently in the same year Technical School established in 1927 at Jorhat was converted to diploma Institute, by abolishing the certificate courses introduced earlier, with the new name of Prince of Wales Institute of Engineering and Technology (POWIET). At degree level, Assam Engineering College (AEC), whose Golden Jubilee is being celebrated from the January 25th of this year (i.e. 2005) with a year-long programme, was first established in 1955 with the name of Assam Civil Engineering College in the same campus of AEI, Chandmari with 72 students in Civil Engineering Branch. Subsequently it was shifted to its own campus at Jalukbari, Guwahati in 1957 with the new name as Assam Engineering College (AEC). Until the creation of a separate Directorate of Technical Education (DTE) by Government of Assam on April 1, 1959, AEC and other Technical Institutions of the state were under the administrative control of Directorate of Public Instruction (DPI). With the creation of a separate Directorate of Technical Education (DTE), the development of Technical Institutions picked up quickly.

Another Engineering College at Jorhat with the name as Jorhat Engineering College (JEC) was established immediately in 1960. A Regional Engineering College (REC) was established at Silchar in 1977 (now it has been upgraded to a National Institute Technology i.e. NIT) on the pattern laid on Society Act by the Government of India with 50% state share allotted from the budget of Directorate of Technical Education, Govt. of Assam on recurring expenditures. Thus along with the sea change in the development of Technical Institutions in the country after independence the moderate growth in Assam has also been attributive to overall supreme excellence of development and performance. Starting with only two Technical School (certificate and diploma level courses) before independence, Assam has now several such Technical School along with eight Engineering Colleges, one NIT (previously REC) and one IIT . More details of some of the well established engineering colleges, NIT and IIT have been compiled under headings of the respective institutes.

There was a dramtical change in the growth of engineering colleges in Assam after 2006. Several private engineering colleges came up with good reputation and attracted the students who were earlier migrating to outer states for engineering courses. The engineering college maintained quality by following the common admission procedure
as followed by govt. engineering colleges in Assam. Altogether 12 Engineering colleges/institutions established in Assam during the period of 2001-2010 and all of them came in last 5 years i.e. 2006-2010. The new engineering institutes include 2 Central Govt. funded; 4 State Govt. funded and 6 Private Institute. During that period only 3 universities of Assam (GU, DU and AUS) stated engineering course and 1 institute (CIT) upgraded its courses from diploma level to degree level.

These colleges are providing engineering education in various streams like electronic & communication, electrical, computer science, information technology, chemical, mechanical, pharmaceutical, automobile through graduate & post graduate degree. They are also developing good quality library and recruiting qualified faculty and library professionals. The results of these engineering colleges are also satisfactory over the period. All the courses are DTE, Assam and AICTE approved. Now, state government is out to develop as a state of science and technology and the state is actively making serious efforts to make Assam equally a state rich in science and technology other developed states. The list of Engineering Colleges and Institutes in Assam is available in Annexure III.

<table>
<thead>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of Colleges</td>
<td>2</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>12</td>
</tr>
</tbody>
</table>

Fig: 3.3 : Line graph of growth of Engineering Colleges in Assam
The engineering college library in its use is essentially a —Humanistic Device—and its chief function is to serve the educational objectives of that college, to aid the faculty in the work and to assist the students in their course. Libraries function as an essential integral component in higher education system. Academic libraries in India are facing a lot of problems due to static budget and exponential price hike of library collections. The library environment is currently undergoing a rapid and dynamic revolution leading to new generation of libraries with the emphasis on e-resources. A lot of efforts have been taken in past few years to overcome this problem of financial crunch by resource sharing through consortia for university libraries.

With the proliferation of engineering colleges in recent years there is an indication that the future of India is bright. But it has its own disadvantage in the sense that quality may be casualty. It is physically and financially impossible for any single library to acquire all published material needed. It is more so with technical education. The rising cost of books, increase in the number of journals and specializations in each subject, inflation, budgetary constraints are the resultant threats for information and publication explosion. Against this, the libraries have a greater role to play in upholding the highest academic standards by offering the best services to their clientele through resources sharing and networking.

3.3 Functions of Engineering College Libraries

Bearing in mind, external factors and consolidation organization has to seek to achieve the aims and objectives of the library.

First, the library is the heart of education. Every education advance depends upon its resources and in larger measure the degree of advance is appropriate to the potential of the library to respond.

Secondly, methods and fashions in education change from generation to generation. But each generation uses the library as a means of realizing its aims. Hence the library remains a great conservator of learning. An investment in a library is a permanent investment. The library is too essential to the maintenance of ideas and to the centralized functioning and thus, the library is the hub if there is free access educational activity in a college. It is the heart of the college. A library work is not a job but a sacred trust. It is a laboratory of humanities. A college library is a reading center for
breasting and enjoying books. Without good library, there can be no good college. Books in college library are dead unless they are used. The total educational process in the college must be library oriented.

**Educative Functions of the Library**

To participate effectively in the college instructional programme, the educative functions of the college library lay in providing materials to the college community adequate for their various needs and purposes.

a) Making easily available through open shelves, orientation, or other efficient means and bibliographically through catalogues; bibliographies and indexes.

b) Making them available for library use and home use through reasonable loan period.

c) By giving formal and informal instruction in the use of the library.

d) By enlightening wide reading through easy accessibility of materials, reader's guidance, displays and book discussion.

e) By enlightening the cooperation of the faculty in making the library a speedy center.

f) By providing bibliographical information on special materials for the faculty.

g) Borrowing needed materials on Inter-library loan from other libraries.

h) Providing adequate and comfortable physical facilities for study including corrals for work on special projects.

i) By extending the hours of services to meet the needs of the users.

The engineering college library is expected to support the objectives of the college. Thus the primary function of the college library is to help the college in carrying out its programmes. The college library does not exist as an independent institution itself. Libraries in progressive colleges seek to fulfill the following functions:

a) To provide comprehensive selection of literature covering the requirements of the college syllabus, together with a selection from humanities and sciences to help a student brooded his reading beyond his practical course.

b) To enable students to be trained in seeking collecting and applying information for themselves.

c) To provide the members of the teaching faculty a substantial nucleus of the more advanced type of books and periodicals necessary to enable them to keep abreast of the latest developments in their subjects.
d) To provide reference services to both postgraduate students and staff and to assist them their studies and research activities.

3.4 The Clientele of Engineering College Library

The library of an engineering college caters various information needs of students, faculty members, research-scholars and staff members. Some of the documents are frequently asked, though available only in scattered discrete pages. Maintaining these scattered documents in separate files is a painstaking task, which requires proper attention on regular basis. As these documents are frequently viewed and photocopied frequently, multiple physical files have to be maintained to meet the demands of the users. Another choice is to store in digital files and give access to them within the campus through computer network. Such frequently asked documents are course syllabuses, university question papers, college test papers, model question papers, question banks, answers to model question papers, career and jobs related information, etc.

The clientele of an engineering college library, like that of other college libraries, includes students, faculty, and other support staff. Needless to say, students' information needs change and broaden as they move from school to college. More than simply listening in a classroom, students take initiative to educate themselves. The college library ought to be an instrument of this self education.

Users of Engineering College Libraries of Assam (Table 3.5)

<table>
<thead>
<tr>
<th></th>
<th>AEC</th>
<th>GIMT</th>
<th>IITG</th>
<th>JEC</th>
<th>NITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>UG Student</td>
<td>1200</td>
<td>900</td>
<td>1407</td>
<td>240</td>
<td>450</td>
</tr>
<tr>
<td>PG Student</td>
<td>150</td>
<td>56</td>
<td>705</td>
<td>90</td>
<td>50</td>
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<tr>
<td>Research Scholars</td>
<td></td>
<td></td>
<td>467</td>
<td></td>
<td>125</td>
</tr>
<tr>
<td>Faculty Members</td>
<td>134'</td>
<td>100</td>
<td>216</td>
<td>104</td>
<td>137</td>
</tr>
<tr>
<td>Staffs</td>
<td>22</td>
<td>35</td>
<td>309</td>
<td>35</td>
<td>52</td>
</tr>
<tr>
<td>Others, if any</td>
<td></td>
<td></td>
<td>350</td>
<td></td>
<td>7</td>
</tr>
<tr>
<td>Total</td>
<td>1506</td>
<td>1091</td>
<td>3454</td>
<td>469</td>
<td>821</td>
</tr>
</tbody>
</table>
3.5 The Engineering College Library Collection

The majority of the engineering college library collection requirement is in the form of books and periodicals, collection of non-book materials, possible collection of maps are also essential. In engineering college libraries, book selection is based on the curriculum and on the syllabi of the courses conducted at the college. Library collection should invariably include:

❖ Books
❖ Conference Proceedings
❖ Periodicals
❖ Reference Materials- Including Indexes and Abstracts
❖ Bibliographies
❖ Dictionaries
❖ Encyclopedias and Handbooks
❖ Electronic Resources
❖ Government Documents
❖ Theses and Dissertations
❖ Standards

Collection of Engineering Colleges of Assam (Table: 3.6)

<table>
<thead>
<tr>
<th>Type of Resource</th>
<th>AEC</th>
<th>GIMT</th>
<th>IITG</th>
<th>JEC</th>
<th>NITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Text Books</td>
<td>60000</td>
<td>14655</td>
<td>96000</td>
<td>40554</td>
<td>62050</td>
</tr>
<tr>
<td>Popular Journals</td>
<td>14</td>
<td>7</td>
<td>30</td>
<td>19</td>
<td></td>
</tr>
<tr>
<td>Subject Journals (Print)</td>
<td>73</td>
<td>15</td>
<td>414</td>
<td>15</td>
<td>115</td>
</tr>
<tr>
<td>Thesis/Dissertation</td>
<td>602</td>
<td>20</td>
<td>118</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Technical Digest</td>
<td></td>
<td>2</td>
<td>338</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CD/DVD</td>
<td></td>
<td>2</td>
<td>3648</td>
<td>2024</td>
<td></td>
</tr>
</tbody>
</table>

3.6 Information Technology and Library Automation

Library automation which started in late 70s in few special libraries has now reached most of the university libraries. Automation is used to reduce the amount of time
devoted to repetitive (and often less challenging) activities that must be done in any properly functioning library. Library automation is the application of computers to perform traditional library housekeeping activities such as acquisition, circulation, cataloguing, reference and serials control. Information and Communication Technology (ICT) has enormously increased the capabilities of library services, creating options for networking to provide access to vast stores of electronic information, for more sophisticated library housekeeping systems and for greater bibliographic access through services. However, technology can also create further pressures and drains on a library’s resources simultaneous for delivering a vastly advanced service. Problems of obsolescence and compatibility of hardware and software can be costly and the demands for training, both of staff and library users are great. Information technology presents both new opportunities and challenges before the library profession as it creates new possibilities for the development of new products and delivery of services. It has also changed the basic assumptions about organizational structure, working relationships and the quality of library services. Some of the characteristics of the current and emerging information environment in which libraries have now to function include greater complexity in locating, analyzing and linking information, sustained financial investment for technology, lack of standardization of both hardware and software. The new information environment requires that librarian’s role should be characterized by increased visibility and vitality. Librarians need to be well integrated into the activities of their institutions and the community they serve.

ICT Based Service Infrastructure in the Libraries

The biggest technological event of the last two decades was the invasion of digital media in an entire range of everyday activities. Libraries also have stocked digital audio/video images and multimedia documents. These digital data can be transmitted in a fast and inexpensive way through data communication networks. The digital libraries of today are network-based distributed systems, with individual servers responsible for maintaining local collections of digital documents. Electronic libraries help to expand access, increase usability and effectiveness, and establish new ways for the individuals to interact with information.
The services are grouped into four categories:

(i) Alert services (content alert services, OPAC, bibliographic compilations),
(ii) Document delivery services (TDP, microfilm and microfiche reading and printing, printing services, JLL, document delivery services, document scanning and translation),
(iii) Search tools (Internet access, literature searching and CD-ROM searching),
and
(iv) Multimedia presentations (audio and video viewing and presentations).

It is encouraging to note that the libraries have not only initiated the process of compiling an OPAC but have also made it available for use to the academic community. This is one of the major effects that technology has had on the library. However, it is to be noted that the content awareness service, which was considered a prime service in the earlier days, has lost its importance with the introduction of the Internet-based services which facilitate users searching for information at their own pace. Among the various services enumerated under this category, translation and interlibrary loan have received the least priority. The popularity for the photocopying service might be due to the non-availability of on-line journal subscription or e-books in most of the libraries. This has necessitated students and scholars to either borrow their relevant materials or to make a photocopy of them.

### Automation status of Engineering Colleges of Assam (Table 3.7)

<table>
<thead>
<tr>
<th>Status</th>
<th>AEC</th>
<th>GIMT</th>
<th>IITG</th>
<th>JEC</th>
<th>NITS</th>
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<tbody>
<tr>
<td>Current status</td>
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<td>In Process</td>
<td>Yes</td>
<td>No</td>
<td>Partial</td>
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<tr>
<td>No of computers</td>
<td>NA</td>
<td>NA</td>
<td>21</td>
<td>NA</td>
<td>26</td>
</tr>
<tr>
<td>Software used</td>
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<td>Soul 2.0</td>
<td>LibSys</td>
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<tr>
<td>Internet connectivity</td>
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<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>LAN</td>
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<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Separate internet section</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>E journals subscription</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Consortia membership</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>
The future libraries are going to be digital libraries and e-libraries. Today we have new technologies to meet this challenge and we call it more fashionably —network! INDEST is one which is aiming at networking all the Engineering College libraries. The existing library staff should be motivated to adapt to modern technologies and learn computer techniques and be partners in this great yagna. The colleges insist internet connections in the Libraries. Internet connectivity facilitates students to browse any number of sites and download the required material for helping readers. Academic libraries have really understood that consortia based subscriptions is cost effective and also avoids redundant expenses and duplicate subscriptions. The effort of UGC-INFONET and INDEST–AICTE Consortium are appreciable and will definitely strengthen higher education system in India free and or highly subsidized access to scholarly e-resources will help educational institutions in fulfill their mission in to reality. These are the two major initiatives are revolutionary steps in providing scholarly resources including peer reviewed journals, databases, abstracts, proceedings etc. These efforts are a boon to university library users which will definitely boost the level of higher education system in our country. In the long run consortia approach will be much more popular in user community and that day is not so far behind when consortia approach will expand the country's information base.

3.7 Building of electronic resources in libraries

Apart from providing library services to the users, the college library supplements the pedagogy of academics. As part of the pedagogy, the students ask many gray-literature based documents for their learning, preparing assignments, preparing examinations and other purposes. All these frequently asked documents can be provided to the users if a college library maintains a library website, which may be a part of college websites, to host such documents in common digital formats. In addition, library site can host documents like course materials, course calendars, assignments, lesson plans, academic journals, published and unpublished articles of the faculty members and research scholars, etc. A user survey should be undertaken to know the information needs of various users groups. Accordingly documents will be scanned and placed on the library sites. Also evaluation of the contents should be undertaken regularly to reduce the
redundancy factors. A feedback form can also be added in the library site, to get the reactions and suggestions of the users.

It is quite unfortunate to note that while there is a great revolution in the world of electronic publishing, there is very little effort on the part of the libraries to keep track of the current trends. This is primarily due to

(i) Lack of awareness on the part of the academic community regarding the availability of the electronic resources in their concerned subjects
(ii) Absence of library collection development committees having a complete inventory of authorized on-line resources,
(iii) Lack of demand from the users for electronic materials, and above all,
(iv) Lack of access to the computers to make use of the electronic collections.

This implies that a concrete effort needs to be taken to improve the computers as well as the amount of electronic resources in relevant subjects. The collection development policy of the individual institutions needs to be reformed in order to cope with the current trends and also to give wide access to the world's literature for the academic community. This would help to minimize the digital divide existing between the libraries with rich and poor collections. Besides, this would help the libraries to participate in the expanding library consortium that facilitates resource sharing among the publishers, engineering college libraries and the professional bodies.

**Building of in-house resources in the libraries**

In-house databases include the compilation of bibliographic databases of books, journals, back volumes, theses and dissertations available in individual libraries. The encouragement received both from within the institutions, as well as from the professional agencies outside the libraries, acts as a highly motivating factor for the library professionals in this region to take up this task with great interest. If such opportunities were extended to the library technical professionals in the other regions, the situation could be improved. Besides most of the training programmes are organized at the state headquarters and this means that only the professionals within this region can take advantage of this facility. In the future, professional associations
should come forward to extend their training programmes to outside the Guwahati regions. Moreover on-line tutorials and Web-based training programs could be initiated to allow the library professionals in the various regions to be trained in their area of activities.

3.8 Summing Up
Since the early eighties, due to rapid industrialization and economic growth, engineering and technical education in India have been developing faster than anywhere else in the world, and now India has a huge number of engineering students in the world. In a recent assessment by the United Nations, the Indian economy was rated in top ten in the world and it is expected to move on higher rank in near future. Since technical education determines the development and socio-economic condition of a nation, there is a greater need for high quality technical education to produce technically skilled man-power in India. The study itself shows the magnificent growth of engineering education in India. There are a large number of engineering colleges and technical institutions which are supported by the central and state governments. Besides, there are also a huge number of private engineering collages. Government expenditure in technical education has increased by almost 400 times from the First Five Year Plan. Maximum states such as Andhra Pradesh, Tamil Nadu, Maharashtra, Gujarat, Assam etc. have experienced phenomenal growth both in number of students and engineering institutions over the last two decades.

The scope and future in engineering field is very bright. With rapid increase in infrastructure in the four growth centers of the world, namely, Brazil, Russia, India and China, civil engineering and electrical engineering offered enormous opportunities. Power plant construction as well as highway, airport and seaport construction would see considerable investment and job opportunities in India; even the growing I.T. industry needs heavy investment in physical facilities, the traditional strength of civil and electrical engineers. Apart from that, with global warming around the corner, increased awareness of pollution and tighter emission control from vehicles, there will be ample opportunities for environmental engineers.

Engineering as a subject covers altogether 25 branches catering to industries, technology and business. Engineers from each branch acquire knowledge that can be
applied in many fields: computer, medical, power distribution, missile guidance and other business areas. They also pursue engineering management and sales, which facilitate them for marketing process and planning for installation. They also opt for post-graduate programs, Ph.D. and business management after obtaining their basic degree, which help them occupy senior position in both government and private sector as a consultant or a planner.

The present study on Indian engineering and technical education reveals that the leading institutions (IITs, NITs, IISc) and almost all other engineering collages have adopted standard competitive research and object oriented engineering study programmes. These programmes are innovative in nature and offer tremendous advantages to students, universities and industries. The main benefits of the engineering studies to the students can be summarized as: gaining confidence in decision making, relating theory with practice, increased job opportunities, realization of responsibilities, opportunities to know one's weaknesses and strengths, and opportunities to work with modern equipments and on problems of current importance. Finally, it can be concluded that universities should adopt more job and object oriented engineering education curriculum linked with industries and research organizations to meet the present and future challenges of rapid technological changes and industrial development in India.

In spite of the great enthusiasm and hope generated by the present day engineering education, unknowingly imperceptible damage is done to the future generation by the very same education. The number of engineering branches during the last few decades has grown by genetic reproduction, mutation and crossover to more than two dozen! For example, civil has split into architecture, environment, and transport and so on; mechanical has branched out to automobile, textile, production, industrial, ceramic, chemical and many more; and the broad electrical engineering has taken different avatars like computers, information, telecommunication, instrumentation and so forth. Such bifurcations could restrict or even ruin the later career of the student.