CHAPTER - 3

REVIEW OF LITERATURE
CHAPTER - 3

REVIEW OF LITERATURE

3.1 INTRODUCTION

This chapter is a part of customary process of reviewing of the existing literature which can pave the way for research and give the guidelines in progress of research work. But in reality the topic for research is so unique that, no thesis work is published in relation related to topic in any university. But still the search of literature was undertaken through various papers, articles, reports, and books around following relevant and important aspects.

I. Studies that have been made in the past in India and abroad to find some link with the topic of study and can throw light on its betterment.

II. To identify the views presented by the different researchers about globalization, liberalization and higher education system in India. In light of this Marketing of educational services.

III. Linkage in between globalization, liberalization and technical education.

By studying the news published in newspapers, published papers of scholars and very specially by the personal observation, as associated with one technical institution for long period became the source for idea generation for selection of subject by this research hypothesis are put forward.
3.2 TECHNICAL EDUCATION FOR TOMORROW.

B.M. Naik, states in his book that, in this age of science and technology, the role of technical education in various walks of life, vocations and professions are achieving significant importance. It is influencing so greatly that the social, economical and political culture of the world is undergoing almost a complete change on account of technology. New jobs in the fields of computers, electronics etc., unheard of a few years before, have come in existence.

He also states that the basis of development, of any country today, lies in its industrialization. More the industrialization more is the development, which in turn depends on technical education of its personnel, besides the availability of raw materials, minerals etc. It is also being realized that the economic, political and military power of a country depends upon its technological power, in India. Although we have the third largest scientific and technical personnel in absolute terms, we have only 3.8 per 1000 population while countries like Japan have 170.

In book importance of technical education is given around certain recent developments that are taking place in the international situation of transfer of technology. The developed countries like U.S.A., Japan day by day are becoming more and more strict and not permitting their latest technology to cross their borders of course they are saying this in sugar coated words that their technology would not suit our purpose. This has been the experience especially in the
fields of electronics, computers, automobile etc. We have been consequently, forced to buy the penultimate or second grade technology.

Around above situation we have to catch the second industrial revolution which is characterised by microelectronics, robots, space technology, solar energy, computers, biotechnology etc. which is picking up momentum. If we miss this train as we missed the first industrial revolution the dangers will be for more grave. We are likely to be left permanently behind and our future generations may not pardon us. Therefore any neglect of technical education is going to be disastrous. As stated by writer-

**Technical Education Alone can help in converting raw-materials into usable goods and services.**

It is said that India is a rich country but inhabited by poor people. It is quite rich in terms of natural resources like land, water, minerals etc. but they are not utilised properly. The population of the country is very large and hard working but it is not equipped adequately in terms of knowledge of science and technology. The only active resource of any country is the human resource. Other resources like minerals, land etc. are passive and inert. They do not do any work by themselves. Due to the lack of technical capability of our personnel and scarcity of technological knowledge our rich resources are unexplored and underutilised.

Consequently, we have been exporting raw materials, like iron ore at very cheap price and importing finished steel at a very high price. Right from the beginning we are at the receiving end, buying
technology at all the times. India is a richly endowed nation, and what we suffer from is not so much the paucity of resources but the inability to make most of them. Our problem is not so much of inadequacy of resources but their productive utilization for which technical education is important.

3.3 **TO B.E. OR NOT TO B.E.**

Apart from above story i.e. about importance of technical education for one controversial news is flashed in Outlook Journal 19 sep. 2004 about, a spate of engineering colleges in Punjab and Haryana have left many half empty. In this news published is as, like all good bubbles, this is too is hard to burst. There was a time when the magic formula for raking in the Moo9ah in Punjab and Haryana was setting up an engineering college. Long ques and hefty donations pouring in was what the pundits predicted. But the golden goose had failed to deliver. Many engineering colleges in Punjab and Haryana are running empty, desolate classrooms, idle teachers and frantic managements trying out every possible marketing strategy to woo students, has become the order of the day. Forget donations, prospective students are now bargaining with college managements for fee concessions!

The figures say it all. At the end of the counselling sessions held by the Punjab Technical University (PTU) to which 41 engineering colleges of the state are affiliated, about 40 percent of the seats are laying vacant. Out of a total of 12,410 seats, there are no takers for 4,000. The situation in Haryana is only slightly better. At the end of central counselling conducted by the Guru Jambeshwar
University (GJU) for its 10,195 seats (excluding the 25 percent management quota) as many as 2,000 seats are vacant.

So desperate is the hunt for candidates in Punjab that the PTU has allowed even those students who have not appeared in any engineering entrance examination to be considered for admission. And this has led to the charge that the university is lowering its standards.

Faced with an unprecedented shortage of students, managements are now offering 'scholarships' - a euphemism for fee concessions. "Any percentage, No CET (common entrance test), No AIEEE (All India Engineering Entrance Examination) required" reads an advertisement of an engineering college in Punjab which has more than half its seats vacant.

Many colleges are offering annual fee concessions between Rs 20,000 to 30,000. Others have begun marketing their courses in countries like Mongolia, Nepal and Burma. "As a result of their marketing efforts, they have managed to get seven students from Mongolia. They also begun an advertising campaign in other neighbouring countries as well." The reason for above scenario is stated around increased in number of institution.

In the last two to three years, there has been a rash of private engineering colleges across Punjab and Haryana. The counted buildings, many of which house a cluster of colleges ranging from engineering to management to nursing. Opening an educational
institution, preferably a technical one, was seen as a lucrative business proposition. From 16 engineering colleges in 2000, Punjab now has 41. Haryana had 24 such colleges in 2000, this has gone up to 36.

So the above information had set the most important guideline for giving the direction for research. The story of Punjab and Haryana is ringing of danger bell to the sleepy private technical institution about changing scenario. It directly indicate that students i.e. customers of institution are finding some other opportunities or because of some dissatisfaction from institution they had diverted to other institution in other area.

This deficiencly of students create the need of marketing of institutes infront of management to cope up with the problems. This same situation is also observed in Maharashtra which is clarified in news of Lokmat news paper. This information paved the way for research.

News flashed in Lokmat news paper on 19th Sep. 2003. Where it is highlighted that 50% seats from total intake capacity of first years engineering are vacant. Long list is given for various engineering colleges having number of vacant seats. Reason stated (was lack of facility) from the institutions to the students, so for they were directed to other universities.
3.4 CHANGING WORLD: CAPACITY TO COPE WITH.

From above awareness information it is clear that among student awareness is increasing because of which some problems are emerging for technical institution. More light is thrown by B. M. Naik\textsuperscript{29} again in his book new vistas about challenges. They state that, the whole world is seeking change, so we must change. Our institutions, their organization structures, systems and procedures, which although at one time have served well, no more suit the purpose today. They must be improved to enable us to cope with the changing world. With the increased facility of communication globalization of market, internationalism in trade and commerce, migration of human and intellectual capital is tending to become the order of the day. Competition is no more domestic and regional but it is global. So as to prepare the youths for such competitive environment, the technical education institutions and the teachers in particular, ought to possess Global Vision, and Global attitudes.

As per writer producing just simple engineers now is not enough. Technical education institutions now would have to turn out engineers competent by world standards. This demands world class institutes and teachers. Means first there should be analysis of systems to find its strength and weaknesses and as per this identifying the need of change in systems.

PROBLEMS: B. M. Naik had explained various problems related to technical education which are as follows:

Today, the teachers and institutes have less of opportunities
to be in touch with innovations in developed world; libraries are in bad shape; the curricula are irrelevant and outdated; examination system is too bulky and consumes too much time leaving less time for learning; institutes have become teaching shops entrepreneurhip and do not involve in research; lessons teaching career is not attractive and the positions of teaching are vacant; institute industry interaction is lacking; peoples demand on technical education are not met with.

They further state necessity to examine such problems scientifically, dispassionately and evolve solutions, and strategies for their implementation. Even they state, as per education policy 1986 education should be more responsive to the industrial needs and the aspirations of youths, for which the education commission has recommended grant of autonomy to colleges. Unfortunately so far not a single college in Maharashtra State has been granted autonomy. So they suggest around above seminars should arranged and put forward importance of it infront of government. With this they highlighted problems in continuing engineering education programmes in colleges, to arrange foreign aid to modernise the institutions by restructuring of institutions and revising the systems and procedures.

**Challenges : The main challenges which are stated as :**

- **a]** Improving quality/ standard and relevance of education to meet the needs of working life, taking into account the emerging technologist, intellectual capabilites of people, and growing industrial needs, is the second challenge. It is necessary to create a work force
of human resources capable enough to design, install and maintain industries, competitive by nothing less than international standards. This is because of the recent trend of internationalism in trade and commerce. To fight with smuggling of goods from foreign countries in a right way, it is necessary to make our industrial products sophisticated in terms of quality, reliability, finish and yet cost effective. This of course demands technical education of better quality to our masses.

b] Forecasting the pattern of establishment of industries and employment in future and shaping the technical education in that direction is no doubt a difficult challenge. Imbalances in manpower generation and manpower requirement are attempted to be kept to a minimum, for which forecasting of future industrial society, nature of industries, jobs therein, is very important.

c] Making educational complexes attractive enough, to young and old, so that the entire society becomes a continuously learning society.

d] Finances required for technical education are increasing from time to time. To mobilise the required financial resources especially in a scarcity situation, like in India, is yet another challenge. But more difficult than that is how to make effective utilization of available finance.

Solutions :- B. M. Naik express, that the solution lies in expansion and diversification of technical education facilities.
Engineers are considered to be the primemovers, the engines for growth and development, of a nation without which the raw resources cannot be converted into usable goods and services. So essential for raising the standard of life. To catch up with the rest of the world and remain on the forefront in respect of technology, economy and politics, it is very essential to have a large number of engineers.

The recent trend that the technical education is going in private sector especially for meeting the growing education needs of society is a welcome sign. Newer ideas are being generated to make education more relevant responsive to local needs and yet cost effective. They are making a value addition in human resources at no cost to the government, and hence they should be well come. Peoples public participation, enthusiasm in this cause needs to be shaped well.

Producing engineers in only conventional branches like Civil, Mechanical and Electrical is not enough. There are vast employment generation and economic development opportunities in the fields. Such as electronics, ship building, space technology, atomic energy, oceanography, bio-technology, natural energy resources, computer technology, transportation, etc. which need to be harvested for which technical education reaching to excellence is the need of the hour. Thus technical education and training be oriented towards newer sectors rather than traditional disciplines.
The entire world is a job market for the highly educated youth. The mobility of personnel who have received graduate and post graduate education, world over, is very high. Availability of job should therefore not pose any problem. Career engineers in fact create jobs. With this other solution lies in financial allocation and resource generation is essential to meet people ever growing demands on technical education.

3.5 CHALLENGES TO TECHNICAL EDUCATION IN LIGHT OF GLOBALIZATION AND LIBERALIZATION.

Below are the articles published by the renowned authors through different papers and books. Specially for the challenges to technical education as effect of globalization and liberalization policy.

Dr. L. N. Mittal\textsuperscript{12} express his views as, “Due to liberalization of economy since 1990, there has been a mushroom growth of technical education, national and international competition will be on the increase in the manufacture and service sectors. In the world of work, survival of the fittest will be the rest under the above circumstances. So they asked, what should be done to improve the technical education system?”

Over the years, the need of technical man power has increased enormously in both private and public sectors. Soon the Government realized that its economic resources are limited and it is no long in position to invest in technical institutions to meet the mark.
demands. Hence the Government followed the policy of liberalization, privatization and globalization. Liberalization has opened vistas to foreign colleges and universities to offer joint venture program privatization policy enabled many to start self financing institute globalization has created a transparent media, a picturisation of the latest technology in any part of the globe and hence created a highly competitive environment. Due to these developments teachers, principals or directors can no more nurse an attitude that “Quality” is the prerogation of industry and not institutions state by Dr. O. Mahers & Dr. B. Satyanrayana while stating the importance of quality in changed scenario.

As per, Dr. D. M. Sarwate protected market scenario changed in 1991, when India announced its policy of liberalization Delicensing, opening of our doors to foreign organisation, Privatisation resulted in a complete new picture. For many Indian organisations now, it is matter of survival. Now seller’s market changed to buyer’s market. Customer become demanding. Organisation soon started realising that their survival and growth depends on generating customer satisfaction. From this they explained effect of liberalization on market conditions.

Dr. P. J. George directly state the challenges of globalization as: “Globalization has resulted in many new challenges to the technical education system. Till recently, we have been producing manpower needed for the Indian industry which were well protected so far as their markets were concerned. In that scenario, new designs and innovations were seldom needed, quality was never
a major concern, competition was practically absent, productivity and discipline were not so critical, management practices were outdated, profit-marking as never a concern for the predominantly public sector industries and other undertakings. Technologies were mostly imported and the training needed for these technologies were generally carried out abroad. Thus, there was very little challenges to the engineering graduate who join the industry.

But globalization has opened up the economy to global players and change scenario for the industry and services sectors. They have set up manufacturing facilities and service organizations with the state of the art, latest technologies, management practices and marking techniques. New products and services are being introduced continuously with improved quality and customer focus. The key input to the success of this new brand of industries and service units in a group of highly motivated and meticulously trained work force. The knowledge and technical skills of this workforce have to be regularly updated and enhanced as new innovations and technologies appear in the design, manufacturing and marketing areas.

For this the products coming out of our technical education institutions should be capable of meeting the challenges of the modern industry. They should be up-to-date in their technical know-how, have the willingness and capability to learn new things as and when they appear, have a deep sense of quality, work ethics and motivation and be conversant with the skills needed to perform well in a job.
UN elucidate opportunities of globalization as -

Globalization being a dominant force in the 21\textsuperscript{st} century is providing new opportunities to countries around the world through economic liberalization, foreign investments and capital flows, technological change and information flows. Yet the impact of globalization has not been equal, nor has its benefits spread equitably across countries. Report by United Nations\textsuperscript{5}.

According to M. A. Mulay\textsuperscript{7}. In the new millennium, technical education system of the state will take lead in technology and become the guiding force for the development of the society at large. Due to liberalization, globalization and privatization the customer of technical education system are facing various challenges in technology sector and knowledge sector. Hence it is very essential to develop the capability to face the challenges in the technical manpower produced by the technical education system.

Prof. R. S. Nrirjar Explains\textsuperscript{10}, "Globalisation and liberalisation of Indian economy has intensified competition in various sectors such as industry, agriculture and services. However the educational institutions which cater to the human resources development component of the above sectors have yet to realize the impact of market forces. Especially, the technical institutions are expected to set an example in propagating quality consciousness, teamwork and manage the competitive environment and encourage team spirit among all concern."

Above explanation by different authors is useful for understanding the views of them clearing the idea on liberalization and globalization and its impact on technical education.
3.6 MARKETING CONCEPT.

View of different authors are reviewed for understanding the concept of marketing and as per that applying the concept of marketing in study.

Now marketing term is just not about the advertising or personal selling of goods and services. It is not just two activities of marketing. But Boone and Kurtz define marketing as “Marketing is the process of planning and executing the conception, pricing, promotion and distribution of ideas, goods, services, organizations, and events to create and maintain relationships that will satisfy individual and organizational objectives”.

Whether the buyer is satisfied after purchase depends on the offer’s performance in relation to the buyer’s expectations. In general, satisfaction is a person’s feeling of pleasure or disappointment resulting from comparing a product’s perceived performance (or outcome) in relation to his or her expectations. If the performance falls short of expectations, the customer is dissatisfied. If the performance matches the expectations, the customer is satisfied. If the performance exceeds expectations, the customer is highly satisfied or delighted. This view is expressed by well known writer of marketing, Philip Kotler.

Above explanation clearly explain that how marketing is related to customer satisfaction.

We are entering a new stage of the history of education challenge. In order to cope with the massive change of scale, not only
for better administration of resources but also for better education for all. In a sense, the education of future generations will entail trade-offs not only between quality and quantity but also between global and local issues. Information and communication technology may come to the rescue of some of their problems, expressed by Antonio M. Battro\textsuperscript{13}.

This is the explanation which states the importance of quality in education around global and local context. Again while explaining the importance of quality in marketing around customer needs Tony Attwood\textsuperscript{14} says, “The dominant factor is the product or service that you offer, produce something that no one wants and you won’t sell it, no matter how wonderful your advertising. Produce something that everyone wants and include the worst design and test in the world and you will still sell it.”

Ramachandra Ayasri\textsuperscript{3} explain the idea of customers for education institute. He drafted, “Our customer is a student. The student gets delighted when the service provided meets his expectation. In the present context, where university enjoys monopoly, it can get away even without considering the variables their influence the student delight. In the years to come, in the light of the resource constraints a head, the universities also have to struggle to catch the attention of the students.”

As above, below is the view expressed by the renowned writers about various terms used in marketing like quality, satisfaction, brand image, consumers behaviour, etc. H. Chaturvedi\textsuperscript{6}
proposed, "While entering into the 21st century, India should launch a nation wide total quality movement which will be developed by taking account of experience of world wide leaders in TQM. It should take up a new path which will be different from currently followed practices."

A. K. Gupta & J. K. Sharma explain importance of brand image as, "The advantage of brand image to sellers are to provide helps in product identification, in a highly competitive market, it can carve out a niche for itself through product differentiation, and in case loyalty can be enveloped through successful promotion, the firm will be able to exert quasi-monopolistic power."

As per Greg. Cound & Lyle Yorks, "The emerging paradigm requires that a customer value orientation be driven into all parts of the organization. To do this managers must develop a comprehensive approach to measuring customer needs, quality of products and services delivered, customer value and customer satisfaction. They should begin with developing a customer value strategy using methods of market research."

Swift, identifies the problem areas for the selected engineering institutions and reports the benefits of group project. It suggests the measures for improvement in quality of education with application of quality control and management.

Cheng, states education quality as, "A multidimensional concept that cannot be assessed by only one indicator. By amalgamating ideas from total quality management with a system

Leon G. Schiffman & Leslie Lazar Kanuk express importance of knowing customers need and wants. "The field of consumer behaviour is rooted in a marketing strategy that evolved in the late 1950s, when some marketers began to realize that they sell more goods, more easily, if they produced only those goods they had already determined that consumer would buy. Instead trying to persuade customers to buy what the firm has already produced, marketing oriented firms found that was a lot easier to produce only products they had first confirmed, through research, that consumers wanted. Consumer needs and wants have become the firm’s primary focus. This consumer-oriented marketing philosophy came to be known as the marketing concept."

3.7 HIGHER EDUCATION FOR SALE

In this age, like other public services, higher education is slowly being drawn into the world of the market. Students are now consumers, free to choose the best courses and there is big money to be made by private firms. But will this clash with education’s main goal of giving as many people as possible access to knowledge?

This is the view published in Education Today- UNESCO News letter on web, http://portail.unesco.org. As per this letter in India higher education is introduce for sale. Mainly the seller is coming from abroad they are using various ways for introducing their education for Indian students. Around this in future students in
Mumbai, Dakar or St. Petersburg will be able, at the click of a computer mouse, to download the content of classes being taught at the Massachusetts Institute of Technology (MIT). The renowned American university, with funding from two private foundations, has decided to put some of its courses online for the benefit of students and teachers all over the world.

This is very generous. But an exception, because higher education is moving towards increased rivalry and profit. It has not escaped the demands of globalization any more than other sectors have. Lecture halls are no longer simply places where courses are taught. Students are now consumers, free to choose the best course they can find in a “market” that has become worldwide.

**Promising market:** This market is promising. Letter says fee income from foreign students studying in member countries topped $30 billion in 1999. The massive spread of higher education means even more money can be made in the future. United States investment bankers Merrill Lynch predict today’s total of 80 million students will have doubled by 2025.

Another sign of the way things are going is that two of the biggest firms selling higher education in the United States, Apollo and Sylvan Learning, are now quoted on the stock exchange. So it is no surprise that the World Trade Organisation (WTO) has turned its attention to this lucrative sector. Since 1994, the General Agreement on Trade in Services (GATS) has included education, especially higher education, on a list of services to be privatized. This means
that by the time negotiations are completed in 2004, member states must have reached agreement on facilitating the flow of students and educational resources, and establishing colleges and campuses in foreign countries.

But the opening up of universities to foreigners is nothing new. People have always gone abroad to perfect their knowledge of a language or complete their training. "Erasmus travelled and Oxford University was founded by English students who could not study at the Sorbonne," notes UNESCO Assistant Director-General for Education, John Daniel. "So it isn't so much revolution as evolution that's happening now." "The higher education market has been around for a very long time too, even if it wasn't called that", according to Kurt Larsen, Principal Administrator of the Centre for Educational Research and Innovation.

What has changed through, is how education is delivered. New technology has revolutionized distant learning. Even though its share of world trade is still very small, online courses and educational CD-Roms will continue to grow. The irony is that while you can now educate yourself from home, students can move around more easily than ever before. Letter says there were 1.3 million foreigners studying in its member countries in 1998, rising to 1.5 million the following year.
3.8 IMPACT OF GLOBALISATION ON TECHNICAL EDUCATION

Prof. A. J. Fulzele, Prof. V. I. Manekar describe the impact of globalization in technical education related to previous discussion, present topic will give more clear idea. They explain topic as under.

The field of education, including technical education is passing through drastic changes, in the wake of the introduction and popularisation of concepts of global village, virtual university, global campus and global competency.

One cannot afford to remain isolated and aloof to the mainstream flow in the contemporary world if he desires to excel in this field of work. Development demands quality and quality demand the urge to perfection. Quality is achieved through improvements and improvements occur through inclination to change to develop the required competitive strength.

Today the world has acquired the status of global village due to vast advancements in the field of communication, transportation and information technology crossing the physical borders. The different nations of the world are coming together on common issues of trade, business and end of colonial rule throughout the world, has put greater challenges to have global view of many aspects including technical education.

The developed countries are the certain beneficiaries through the globalization concept as it gives them the necessary
market for their consumer goods and services to propagate the market economy paradigm. On the hand, the developing countries like India view globalization in the context of liberalisation and privatisation. Liberalization induces the multinational companies to spread their network with better technology, cost effectiveness, environmental friendly procedures putting much more pressure on local industries who lack in all these aspects rendering themselves very much incompetent to face the challenge for their survival.

To face the challenges posed by globalization technical education system needs to play a key role in developing its product as a global engineers with desirable competency level who will be able to fulfil the requirements of local industries. The industries ultimately has to sustain the pressures of global competition with the high profile manpower supplied by technical education.


Prof A. J. Fulzele again explain following concepts around globalization.

A. Concept of global campus.

In this information age, the entire world has become global campus by diffusing physical borders of individual nations providing students the much- required access to information of advancement in technologies and knowledge. Global learning encompasses greater options, increased choices, complementary learning, enhanced competency levels and extended access.
B. Globalization of Technical Education

Globalization of technical education should ensure the curriculum to be framed in a manner, which will give it a diversified and multicultural look. Reconstruction of curriculum fulfilling the global requirements by incorporating international practices and approaches will provide the curriculum a global perspective. Internationalization of technical education will transform the students into competent human resource who will be capable to uplift the domestic industries to stand the competition posed by multinational companies. Hence it is the need of the hour to have the required foresight to modify the technical education programme to suit the compulsions of global competition. A lot of innovation, involvement and commitment are desired in this regard.

3.9 OUTLOOK OF EDUCATION SYSTEM IN THE US :-

(US - United States of America)

The special report is published in the magazine, "The Global Educator" about the Engineering education system followed by the technical institutions and universities of United States. Report provides better guideline for understanding special features of the education system and also helpfull for comparison, identifying differences and forwarding study in proper direction around its objectives. Report mainly contains following points -

3.9.1 Introduction about engineering education System :-

The United States with over 3000 engineering schools offers more than 50 specialisations to choose from. It provides an
environment that is conducive to the growth of a student and a researcher.

Although not identical, the terms ‘college’ and university are used interchangeably for educational institutions in the US. There is no legal or official control over the institution’s option to choose one or the other as a part of its name. A ‘college’ usually refers to an undergraduate institution offering a bachelor’s degree while ‘university’ refers to institutes offering the bachelor’s as well as masters and doctoral degrees.

Universities or colleges are either private or public. The most basic difference between public and private institutions is about how they are funded. State taxes support public colleges and universities. This keeps down the cost of tuition for residents of that state.

Private colleges and universities receive much less of the taxpayer’s money and rely more upon tuition for financial support. Hence these are more expensive.

Academically, both public and private institutions range from excellent to ordinary. Private schools are not inherently better than public schools. Private school like Carnegie Mellon are considered the best in providing quality education to students but public schools such as the university of California-Berkeley are also considered among the best schools in the nation. Choosing between the schools needs a thorough research on how well the school’s culture fits into the requirements of the applicant.
Primarily, engineering education in US can be categorised into Undergraduate and Graduate Studies and the graduates can be further looked upon as those pursuing a Master’s degree and those doing a Doctoral programme.

3.9.2. Undergraduate Studies in Engineering

Most of US schools offer a Bachelor of Science (BS) and/or Bachelor of Arts (BA) degree in Engineering. The BA degree is a liberal arts degree. It provides general knowledge in many fields and emphasises intellectual skills such as thinking, problem solving, reasoning and judgement. The primary goal of a liberal arts degree is not to prepare the students for a specific job but to develop an educated citizen, the traditional objective of a college education.

The BS degree is more specialised than the BA. It lays greater emphasis on mathematics, science and computer skills. It is more appropriate for students planning research careers in areas requiring a strong background in mathematics and the sciences.

The BA degree is recommended for fields like Psychology, Languages, and Philosophy, while a BS degree is appropriate for technical fields and for the study of sciences like Mathematics, Life Sciences and Health Sciences.

Thus, most engineering aspirants would prefer a BS degree in engineering over a BA degree. Also, a recommendation in case the student is interested pursuing graduate studies in engineering. However, the option of a master’s degree is still open to students with a BA degree. They would need to take a few additional courses to fulfill the prerequisites.
3.9.3. Curriculum

The BS or BA in engineering is a 4 year undergraduate degree programme in the US. Engineering students are usually required to complete a series of general education courses before choosing in a specific major. Most undergraduate students are required to take courses that are part of a core curriculum in the first two years of study. General requirements include humanities, literature and science and maths courses.

During the first two years, students also need to fulfill the prerequisite or introductory courses in the subject of their interest. For example, a student desiring to major in Electrical engineering would require courses like Networks and Circuits, Basic Electronics and Electromagnetics in the first two years of the degree. In the final two years, students choose from courses that relate to their specific major.

Most undergraduate programmes will combine mathematical and scientific theory with hands-on laboratory experience in order to prepare students for postgraduate studies or immediate entry to the workforce. Students are allowed sufficient flexibility in deciding courses other than core requirements towards their degree. However, it is advisable not to narrow down one’s scope of study during undergraduate studies since it limits the number of specialisations one could opt for at the Master’s level.

The good part of US institutions is that interested students always have an option to pursue a field of interest that is different from their previous education. Taking additional courses to
satisfy the academic requirements for admission can do this.

3.9.4. Engineering Programmes

A] Two-Year Engineering Programmes

Community colleges in the US offer technical engineering degrees including an Associate of Science (A.S.) and Associate of Applied Science (A.A.S.). After completing an Associate's degree, students are qualified to work as a technician, or may proceed to a four-year institution to earn a Bachelor's degree.

B] Graduate Studies in Engineering in the US

Graduate Studies in the US are designed to expand and deepen the knowledge and skills acquired as an undergraduate. The Master's programmes work towards a specialised area within a field of study in engineering. For example, a student with a BS in Mechanical Engineering may choose to specialise in Design at the Master's level.

PhD programmes are generally designed for people primarily interested in research and education in the engineering field.

C] Master's Programme Curriculum

Postgraduate Engineering Students earn a Master of Science (MS) or a Master of Engineering degree (MEng) degree. The Master of Engineering degree (MEng) focuses on improving essential technical and professional skills, while a traditional Master of Science degree (MS) emphasises on a comprehensive understanding of a research area.
The Master of Science (MS) usually involves research and a thesis, although some universities do offer the non-thesis. The Master of Engineering degree (MEng) replaces the research and thesis with a project that is geared towards industry skills. The MEng is intended as a technical degree (that is, not on the way to a PhD) for people who want to walk in industry soon after the course is completed.

Many engineering schools offer a curriculum with a focus on using technology, working in terms and taking courses in other disciplines. The universities offer either a thesis option wherein the degree requirements include a project or research work in addition to coursework, while a non-thesis option only requires coursework as a degree requirement. Most of the programmes require students to take about 10 to 13 courses over a span of two years, out of which 4 to 5 courses are core requirements while other courses can be chosen by the student. Interdepartmental courses, to some extent, can be counted towards the degree. For example, an Industrial Engineering student may be allowed to take a couple of courses from a business school.

D) Doctoral Programmes

The two highest degrees an engineer can earn are a Doctor of Science (DSc) or Philosophy (PhD). In order to gain a position as a researcher or a teacher, most engineers will need to earn a Doctorate degree. A doctoral programme usually accepts a minimum of seven years of undergraduate and postgraduate study.
The curriculum for a doctorate degree involves extensive coursework covering a range of subjects from the fundamental to advanced levels of study. The objective is to make the doctorate students completely adept in the field and prepare them to handle research problems of any difficulty level and come up with innovative solutions.

The doctorate thesis needs to be an original research work and, hence, problem definition itself takes about a year or so for a student. Most students are involved in literature survey in the initial years to come up with a unique problem for their PhD research. Completing a PhD degree can take time. The duration will depend on the nature of the project take up.

3.9.5 Credit System.

The degree requirements in the US are specified in terms of the number of credits required. Credits are awarded based on the number of teaching and lab hours spent in a week on a particular course. For example if a particular course has 3 classes and 1 lab session during a week then the course is awarded 4 credits towards the degree. In short, it is not just your performance in exams that is taken into consideration but also your attendance, regularity and performance in the class and the lab.

Grade Point Average (GPA)

The grading system is relative unlike the absolute grading followed in most Indian institutions. For each course a student is awarded a grade based on attendance, class participation.
performance in quizzes, tests and final examinations. The grade corresponds to a numerical equivalent on the scale of 4.0. For example, a particular adviser may decide on the grades as:

A+ = 4.0 ; A = 3.5 ; B+ = 3.0 ; B = 2.5

The average of the score on all courses taken in a semester or quarter is calculated to give a grade point average. The cumulative grade point average (CGPA) is the average GPA over the period of study.

3.9.6. For funding of tuition fees in US various options are available which are as follows

A] Fellowships

In case of fellowships, the student is offered a complete tuition waiver and a stipend for bearing living expenses.

B] Assistantships

Assistantships require students to provide services to the university in lieu of which they are paid a stipend.

C] Graduate Assistantship (GA)

The positions include computer lab consultants, students helpers at the graduate office and library.

D] Teaching Assistantship (TA)

There are two kinds of teaching assistants, one who are given grading jobs and the other who are given teaching assignments.
E] Tuition Waiver

In this case the university waives a part of the tuition fees or waives off full tuition fees.

F] On-Campus Jobs

The international student's visa permits them to work on campus on a part-time basis for 20 hours per week.

G] Co-operative Education

Universities that are situated in locations with a high concentration of industries offer a co-operative education option to the students by giving work permit under Curriculum Practical Training. This allows students to work off-campus for 20 hours per week around area of specialisation.

H] Internship

During the summer break the students are eligible to work for 40 hours per week and hence, can apply for internship positions in companies.

So above is the overview of engineering education system which is mostly followed in U.S. As stated earlier study of this report gives the scope for comparison with our system and also useful for giving guideline for formulating marketing strategy for engineering institutions present in Amravati University region for customers satisfaction.
Selected References


2. Dr. L. N. Mittal “Technical Education in 21st century” ISTE News letter Vol. XIX, No. 4 - July, 1999


Books


27. P. Kotler and Fox “Strategic Marketing for educational institutions Prentice-Hall 1985


