Chapter 1
What Is Mechanical Engineering?

Abstract Mechanical engineering is one of the oldest disciplines of engineering, although it gained separate identity in the nineteenth century. The word engineer itself means the constructor of military engines, which falls in the scope of modern day mechanical engineers. Scope of mechanical engineering is quite wide. It finds applications in many fields. Mechanical engineers perform a variety of tasks starting from design to management of machines and equipment. They also perform supportive role in other engineering disciplines. Several engineering disciplines have undergone successful marriage with mechanical engineering. A number of disciplines have emerged as offspring of mechanical engineering, e.g., production engineering, industrial engineering, manufacturing engineering, automobile engineering, aerospace engineering, and mechatronics. Mechanical engineering education has been continuously evolving with the changing level of technology.

Keywords Engineering · Mechanical engineering · Production engineering · Industrial engineering · Manufacturing engineering · Automobile engineering · Aerospace engineering · Mechatronics · Mechanical engineering education

1.1 Introduction

Engineering is as old as the human civilization, although the word 'engineer' came into existence around 1325 AD (Baofu 2009). Our life is very much dependent on engineers and everyone has a feel of engineering, but for many persons there is often a lack of clarity about engineering profession. The more difficult task is to define engineering. The word engineering seems to come from the Latin word 'ingenium' meaning cleverness or from the Latin word 'ingeniare' meaning to contrive device. It is very clear that an engineer is expected to exploit the resources of the nature in an intelligent and optimum manner. Since the time immemorial, human race has been doing this. Like animals, it did not depend only on the organs and limbs provided by the nature. It invented tools, wheel, fire, and many such devices. The process of invention is going on. However, in the beginning, humans

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used to live in small groups and one person used to possess several skills. With the gradual drift toward globalization, the need was felt for the specialization and division of labor. Thus, around fourteenth century, engineering was recognized as a profession in some countries for making weapons and structures, but before that there were many artists and scientist, who were basically engineers.

Many opine that there is no difference between engineering and applied science. Science reveals the truth of the nature. The word science comes from the Latin word 'scientia' meaning knowledge (Wenning and Vieyra 2015). To know the truth is inherent in human nature. The craving for truth is as essential as for the food, water, air, and shelter. We read newspapers, press reports, and analytical articles to know the truth. We carry out space exploration to find out if there is life in other planets or satellites or if it is possible to live on them. The quest for knowledge apparently may not have any motive for getting any benefit out of them. Several mathematicians do research on irrational numbers just for academic interest, deriving pleasure from developing algorithms. Some of them would never have assumed that some of their findings will be useful in cryptography, which is a method of storing and transmitting data in a particular form so that only those for whom it is intended can read and process it (Goldreich 2011). On the other hand, applied scientists aim at practical applications of science.

An engineer uses scientific knowledge for inventing, designing, building, or maintaining some object or system. However, scientific knowledge is not the only knowledge an engineer needs. An engineer also utilizes economic, social, and traditional knowledge. In fact, in several fields, engineering may be older than science. For example, the fire might have been invented accidently and humans learnt to utilize it. The chemistry of fire came to be known much later. Often the term, technology is used interchangeably with science. Several universities provide degree in Bachelor or Master of Technology from their engineering departments. Often there is no distinction in Bachelor of Technology, Bachelor of Engineering, or Bachelor of Science in engineering. That reminds a famous quote of William Shakespeare: 'What's in a name? That which we call a rose, By any other name would smell as sweet' (Shakespeare 1597). However, from an academic point of view, engineering and technology are different though interrelated.

The word 'technology' is derived from the Greek word 'technologia' meaning systematic treatment (Monsma 1986). There are several and sometimes differing interpretation of the word 'technology' and its relation with engineering. Cambridge dictionary defines technology as (the study and knowledge of) the practical, especially industrial, use of scientific discoveries (CUP 2008). The Oxford English Dictionary (2002) defines technology as the application of scientific knowledge for practical purposes, especially in industry. It also defines technology as machinery or devices developed from scientific knowledge and as the branch of knowledge dealing with engineering or applied sciences. These definitions do not bring out clear cut difference between engineering and technology. One way to differentiate engineering with technology is as follows. Technology provides one or several techniques to accomplish a task. The techniques may be based on science or mere common sense. It is the engineer who chooses the proper technology

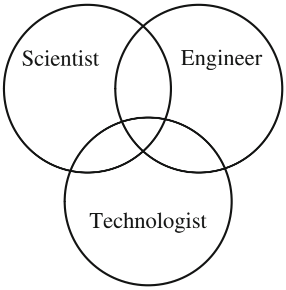

Fig. 1.1 Domains of scientists, engineers, and technologists

considering the economic, social, and environmental factors. It should not, however, be inferred that technology is a part of engineering. Just as engineering utilizes the scientific knowledge, it also utilizes the technology. Scientists, engineers, and technologists at times work together, but may work independently as shown in the form of a Venn diagram in Fig. 1.1.

Suppose there is a sophisticated machine shop. The computer numerical control (CNC) machines of the shop use computer technology, software technology, electrical and electronics technology, and mechanical technology. An engineer managing the shop is dependent on these technologies for the proper functioning of the shop, but the proper functioning also depends on optimum layout, maintenance schedule, proper lighting, and also proper working conditions for the workers including their incentive plans. Technology, for example, will not answer how much incentive should be provided, but the engineering has to deal with this aspect as well.

The following anecdote may bring out the differences between science, engineering, and technology more clearly. Once upon a time, three friends were passing through a forest. They were feeling thirsty, but their water pot was empty. Suddenly they saw a well, but there was no rope to draw the water from the well. The first man asked the second man, ‘You know a lot about plants. Can you identify the grass around here that is strong?’ The second man identified the grass, which had a good tensile strength. Then, the first man asked the third man, ‘You are very skilled. Can you join the number of grass plants by making strong knots and then tie it with the pot?’ The third man made strong knots and the pot was tied with the grass rope and water was drawn from the well. Among these, the first man was an engineer, the second a scientist, and the third a technologist.

Engineering needs inputs from various disciplines for accomplishing a task. Traditional knowledge, technology, physical sciences, economics, social science, and environmental science play a major role in engineering. This is illustrated through Fig. 1.2.

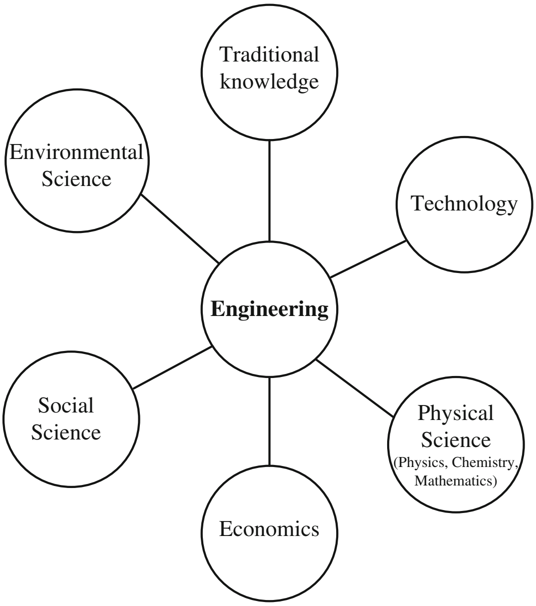

Fig. 1.2 Disciplines that interact with engineering

1.2 Definition of Mechanical Engineering

The word 'engineer' was in use around 1325 AD (Baofu 2009), which meant 'constructor of military engines.' Engines in those days meant military weapons such as catapult or military machines; steam engines were not invented by then. In the eighteenth century, the term civil engineering was coined to distinguish it from military engineering. John Smeaton (1724–1792) is often considered as the father of civil engineering (Duckham 1965). It is clear that civil engineering comprised all engineering branches in those days. Growth of industry and transportation led to provide separate identity to mechanical engineering. In 1847, Institution of Mechanical Engineers was formed in UK (IMechE 2015: http://www.imeche.org/knowledge/library/archive/institution-and-engineering-history). The mechanical engineering can be defined as the branch of engineering dealing with the design, construction, operation, and maintenance of machine. The American Heritage Dictionary of the English Language defines mechanical engineering as the branch of engineering that encompasses the generation and application of heat and mechanical power and the design, production, and use of machines and tools (American Heritage® Dictionary of the English Language 2011).

1.3 Scope of Mechanical Engineering

The scope of mechanical engineering is very wide and apart from primarily mechanical industries like automobiles and machine tools; it finds supportive role in virtually all engineering disciplines. In the ancient and medieval periods of history, a number of inventions were carried out for either reducing the human effort or totally eliminating it. For example, the lever was invented for amplifying the force, so that heavy objects can be lifted with a small amount of force. Similarly, the steam engines and hydraulic turbines totally eliminated the human effort in generating the power. Traditionally, the mechanical engineering has been applying solid mechanics, fluid mechanics, and thermodynamics to the design, fabrication, operation, and maintenance of plants and machinery. Ship designing requires the knowledge of fluid statics and solid–fluid interaction. In thermal power stations, one needs the knowledge of thermodynamics, strength of materials, material science, fluid mechanics, and heat transfer for designing a boiler. Design of hydraulic turbines also requires the knowledge of fluid mechanics for understanding the process of conversion of hydraulic energy into mechanical energy and solid mechanics for mitigating the problems related to stress and vibration of the turbine blades and other rotating parts. Nowadays, in designing and fabricating a device, various disciplines interact, in which the mechanical engineering often plays a major role. A new field called mechatronics is emerging. In fact, mechatronics is often defined as the application of methodology, techniques, and understanding of one or more disciplines to another discipline (Dixit 2012).

Mechanical engineering finds applications in transportation sectors like railways, automotive industries, aeronautical industries, and shipping industries. In the power generation units, the mechanical and electrical engineering have very important roles. In the military field, mechanical engineering finds application in design, manufacture, operation, and maintenance of weapons such as guns, missiles, and tanks. Nowadays, mechanical engineering is having a lot of scope in biomedical field particularly in designing and manufacturing various devices such as pacemakers, dialysis machines, implants, and artificial limbs. In the field of robotics, mechanical, computer, and electronics engineers contribute together. In chemical industries also, the mechanical engineering contribute to the design, maintenance, and operation of plant and machinery. Thermodynamics, heat transfer, and fluid mechanics find a lot of application in chemical industries, which are major subjects of mechanical engineering. The scope of mechanical engineering is expanding to newer fields like nanotechnology and synthetic biology.

1.4 Mechanical Engineering Profession

A young graduate engineer has various options to start a career. A large percentage of mechanical engineers are employed in various industries. In the olden days, the mechanical engineer was responsible for almost all activities related to mechanical engineering. Nowadays, barring very small industries, there are a number of specialized fields in mechanical engineering. Some mechanical engineers become designer, who has the primary task to design plants and machinery or tools, jigs, and fixtures for production purpose. Some mechanical engineers manage the production shops. Some mechanical engineers work in maintenance department, where the main task is to carry out preventive and breakdown maintenance. Of late, condition monitoring-based maintenance is gaining popularity, in which the health of machine is monitored by observing signals such as vibration, and appropriate action is chosen by inferring the signals.

Mechanical engineers working in quality control or assurance department are responsible for in-process and final inspection. They also design various strategies for enhancing the product quality. In the field of marketing, mechanical engineers participate in sales and servicing of the products. Other departments in which mechanical engineers are employed are process planning, stores, purchase and safety.

Opportunities also exist in banking and insurance sector, where mechanical engineers assess the worth of a project, machinery, and plant. They get jobs in software sector as well. There are a number of software jobs, which directly utilize their mechanical engineering skills. For example, mechanical engineers contribute to the development of computer-aided design (CAD) and computer-aided manufacturing (CAM) packages. Other types of software industries use the skills of mechanical engineers in an indirect manner. These industries do not develop mechanical engineering-related software, but prefer to employ the mechanical engineers for their analytical and practical skills. Apart from this, some mechanical engineers take up various managerial and administrative positions.

1.5 Mechanical Engineering Education

A number of universities and colleges run diploma, degree, and postgraduation programs in mechanical engineering. The duration of programs varies from country to country; however, in most of the places, a diploma program is of 3 years duration, a degree program is of 4 years duration and a postgraduation program is of 1 or 2 years duration. A Ph.D. program does not have a fixed duration, although the minimum (say 2 years) and maximum (say 7 years) duration may be prescribed.

Mechanical engineering education comprises courses on basic sciences, humanities and social sciences, mathematics and computer programming, mechanical engineering, and allied engineering. A mechanical engineering student has to study a wide range of theoretical and laboratory courses. On one hand, a student studies the analytical courses like mathematics and computer programming; on the other hand, the student also has to study many applied courses like workshop and machine drawing. The workshop and machine drawing are the important practical courses. In the workshop, student learns basic skills of a craftsman and the operation of machines. In the machine drawing, the student learns to represent physical objects by means of drawings. The important physics-oriented courses are solid mechanics, fluid mechanics, thermodynamics, and heat transfer. The important production-oriented courses are manufacturing technology and industrial engineering. The student also has to study the courses on electrical and electronics engineering. Three broad streams of mechanical engineering are as follows: (1) machine design or solid mechanics, (2) fluid mechanics and thermal engineering, and (3) manufacturing or production.

The world's first institution of technology, the Berg-Schola, which is called University of Miskolc now was founded in Hungary in 1735 (http://www.uni-miskolc.hu/). The oldest German institute of technology called Braunschweig University of Technology (https://www.braunschweig.de/english/business_science_education/tu_bs_eng.html) was founded in 1745 as Collegium Carolinum. Ecole Polytechnique (http://www.polytechnique.edu/) was established in 1794 in France.

In 1818, the first British Professional Society of Civil Engineers was formed in UK (https://www.ice.org.uk/), Institution of Mechanical Engineers, UK was formed in 1847 (http://www.imeche.org/knowledge/library/archive/institution-and-engineering- history). In USA, Civil Engineering Society (http://www.asce.org/) was formed in 1852 and Mining and Metallurgical Engineering Society was formed in 1871 (http://www.aimehq.org/). The American Society of Mechanical Engineering (ASME) was formed in 1880 (http://www.asme.org/) followed by American Society of Electrical Engineering (www.asee.org/) in 1884.

The early schools in the USA to offer engineering education were United States Military Academy (established in 1817), an institution now known as Norwich University (established in 1819) and Rensselaer Polytechnic Institute (established in 1825) (http://www.futuresinengineering.com/what.php?id=1). The first engineering college in Asia was established at Roorkee, India in 1847 (http://www.iitr.ac.in/). It is now known as Indian Institute of Technology Roorkee. However, the first technical institution is School of Survey Guindy established in 1794 (https://www.annauniv.edu/). It started mechanical engineering program in 1894. College of Engineering, Pune (www.coep.org.in/) is the second oldest engineering college in India.

1.6 Offshoots of Mechanical Engineering

As discussed earlier, the term civil engineering was used to refer to non-military applications. Further specialization led to the emergence of mechanical engineering. Four years after the establishment of American Society of Mechanical Engineers, Electrical Engineering Society was formed in 1884. American Society of Chemical Engineers was formed in 1908. Mining and Metallurgical Engineering society was formed in 1871. Although a number of courses of mechanical engineering are taught to students of chemical engineering, mining engineering, and metallurgical engineering, these disciplines evolved more from applied science than from engineering. However, a number of disciplines that exist today can be called as the offshoots of mechanical engineering. In this section, introduction to some important disciplines is provided. The students of these disciplines study several subjects of mechanical engineering.

1.6.1 Production Engineering

As discussed earlier, manufacturing technology is an important part of mechanical engineering, as virtually all manufacturing activities of today take the assistance of machines. In order to achieve high production, proper technology as well as its management is required. Production engineering is a combination of manufacturing technology and management. In America, H.R. Towne (1844–1924) was one of the pioneers in the field of production engineering (Armytage 1961). Production engineering courses became more popular after World War II. In India, the first department of production engineering was established in 1959 at Veermata Jijabai Technological Institute (VJTI), Mumbai, initially as Department of Industrial Engineering.

1.6.2 Industrial Engineering

Frederick Winslow Taylor (1856–1915) is often credited as the father of industrial engineering (Copley 1923). By profession, he was a mechanical engineer and he introduced a lot of techniques for improving the efficiency of the production system. In USA, Henry R. Towne (1844–1924), an ASME member, was one of the pioneers in developing industrial engineering field (http://www.stamfordhistory.org/towne1905.htm). In 1948, a society called American Institute of Industrial Engineers was founded (http://www.iienet2.org/). The word American was dropped in 1981.

From a practical point of view, there is not much difference in the course structure of production engineering and industrial engineering. Both of these disciplines pay more emphasis to manufacturing technology and management-related courses at the cost of in-depth study of basic courses like thermodynamics, heat transfer, fluid mechanics, and solid mechanics. In essence, a production and industrial engineer is provided exposure to almost all courses of mechanical engineering, but the focus is on the courses on manufacturing, quality control, optimization, and decision making.

Many define industrial engineering as a branch of engineering that deals with the optimization of complex processes and systems (Kahraman 2012). From an academic point of view, a production engineer is equally expert in manufacturing technology and its management, while an industrial engineer is more adept in utilizing the technology than in developing the technologies. Thus, industrial engineering is very close to technology management. In practice, the distinction between a production engineer and an industrial engineer is blurred.

1.6.3 Manufacturing Engineering

Whereas industrial engineering and production engineering comprise manufacturing technology and its management, manufacturing engineering is more biased toward technology part at least from a theoretical point of view. Manufacturing engineering is a discipline of engineering dealing with different manufacturing practices and includes the research, design and development of systems, processes, machines, tools, and equipment. A student of manufacturing engineering gets exposure of almost all mechanical engineering, production engineering, and industrial engineering courses, but theoretically the emphasis should be more toward technology. In practice, manufacturing is very close to production engineering and industrial engineering and appears as a branch of mechanical engineering. The Society of Manufacturing Engineers was founded in 1932 (http://www.sme.org/). It was originally named the Society of Tool Engineers. A year later, it was renamed the American Society of Tool Engineers (ASTE). From 1960–1969, it was known as the American Society of Tool and Manufacturing Engineers (ASTME). It became the Society of Manufacturing Engineers (SME) in 1970. In 2013, the use of its full legal name, the Society of Manufacturing Engineers, was discontinued and the organization became known as SME.

The knowledge about materials is as important in manufacturing as the knowledge of fluid properties in fluid mechanics. A manufacturing engineer should be familiar with material science and strength of materials for understanding the mechanics of machining and metal forming. Metal casting requires the melting, flow, and solidification of materials. Many advanced manufacturing processes are based on thermal effects. Therefore, a familiarity with fluid mechanics, heat transfer, and thermodynamics is also essential for a manufacturing engineer. Some process uses the principles of electricity, magnetism, chemistry, and electrochemistry, including relevant topics of physics and chemistry in the curriculum of manufacturing engineering. Moreover, the importance of electrical/electronics, computer science, and manufacturing technology has increased tremendously since last 3–4 decades.

1.6.4 Automobile Engineering

The term automobile is used for a vehicle with engine and wheels that runs on the road. It includes cars, trucks, buses, scooters, motorcycles, and farm tractors. Automobiles are one of the landmark inventions of mechanical engineering. The first car powered by an internal combustion engine was developed in 1807 by Francois Isaac de Rivaz of Switzerland (http://inventors.about.com/od/cstartinventions/a/Car_History.htm). It used a mixture of hydrogen and oxygen for fuel. It was not a very good design, and continuous effort to design the cars resulted in developing comfortable cars as we see them today. Initially, mechanical engineering degree was considered sufficient for working in an automobile industry. With the growth of automobile sector and technology, the discipline of automobile engineering emerged. Today, automobiles utilize mechanical as well as electrical–electronics and computer technology. Hence, the curriculum of automobile engineering comprises the courses on mechanical, electrical, electronics, and computer engineering. Nevertheless, a large portion is from mechanical engineering.

1.6.5 Aerospace Engineering

On December 17, 1903, Wilbur Wright and Orville Wright became the first persons to fly a controllable and self-propelled aircraft made of wood and muslin cloth. The first commercial flight took place between St. Petersburg and Tampa in 1914 (Kalam and Singh 2015). Today, aerospace engineering has emerged as a distinct discipline for engineering related to aircraft and rockets. It is broadly divided into two parts—aeronautical engineering and astronautical engineering. The aeronautical engineering deals with the various aspects of aircraft design, manufacture, maintenance, and operation. The astronautical engineering deals with the outer space. Often it is called rocket science.

1.6.6 Mechatronics

The term mechatronics was coined by a Japanese engineer, Tetsuro Mori, of Yaskawa Electric Corporation (https://www.asme.org/engineering-topics/articles/mechatronics/mechatronics-and-the-role-of-engineers). The trademark right for the word 'mechatronics' was granted to Yaskawa in 1971 and latter abandoned its right on the word in 1982. Mechatronics is defined as the synergetic integration of mechanical engineering, with electrical engineering and/or electronics and possibility with other disciplines for the purposes of design, manufacture, operation, and maintenance of a product (Dixit 2012). Mechatronics education gained popularity since 1991.

Robotics requires the application of mechanical, electrical, electronics, and computer science. It can be called a mechatronics product. Similarly, the automation of machines and processes is gaining importance, which can be the part of mechatronics. Many mechanical engineers are deeply involved in control area, which is a popular subject of electrical/electronics engineering. At many academic institutions, control theory is a compulsory course in mechanical engineering as well.

1.7 Relation of Mechanical Engineering with Other Engineering Disciplines

Mechanical Engineering is closely related with a number of other engineering disciplines. There are many similarities with civil engineering. Both disciplines require a solid foundation in solid mechanics. Civil engineers also have to deal with machines for material testing and constructions. Mechanical engineers have to depend on civil engineering for construction of factory buildings and foundations. Chemical engineers also study courses on fluid mechanics, thermodynamics, heat transfer, and strength of materials. It will not be wrong to assume that chemical engineering largely comprises applied chemistry and mechanical engineering. Pulp and paper technology applies chemical engineering for the manufacture of pulp and papers. Invariably, there is a lot of mechanical engineering involved in it. Mining and metallurgical engineering also has a lot of subjects common with the mechanical engineering. A metallurgist uses a lot of machines and has to be conversant with thermodynamics, heat and mass transfer, and fluid mechanics. Similarly, textile engineering also has to rely on the basic skills of mechanical engineering, particularly in the design of textile machinery.

Electrical engineering plays a vital role in most of the primarily mechanical engineering products. Same is the case of electronics and computer science. These disciplines interact a lot with mechanical engineering. They also require the help of mechanical engineering. Other industry-oriented engineering disciplines that use the mechanical engineering concepts heavily are sugar technology and leather engineering. The engineers working in these fields must be familiar with the basic concept of machines and other equipment such as boiler. Agricultural engineering also includes the elements of mechanical engineering, particularly for the design, maintenance, and operation of agricultural machinery.

Nowadays, there is increasing emphasis on green engineering and sustainability. According to the US Environmental Protection Agency, green engineering is the design, commercialization, and use of processes and products, which are feasible and economical while minimizing (a) generation of pollution at the source and (b) risk to human health and environment (http://www.epa.gov/oppt/greenengineering/pubs/whats_ge.html). The sustainability is the ability to maintain the desired living conditions for all times to go (Dixit et al. 2012). Mechanical engineering finds a vital role in green and sustainable engineering. Some institutions have started a program on environmental engineering within the mechanical engineering department (http://maeweb.ucsd.edu/enviroeng). Mechanical engineers are focusing on improving the efficiency of machines and devices, thereby reducing the pollution. For example, fluidized bed combustion is increasingly used in boilers instead of the traditional burning of coal. At the same time, alternate renewable energy sources, like wind energy and solar energy, are being explored. There is also a drive to minimize cutting fluids and lubricants in machining because of the harm they cause to human health (Dixit et al. 2012). Concept of life cycle thinking is gaining importance. For example, some metallic components in an automobile may be replaced by a fiber reinforced polymer matrix composites. However, one must consider the issue of disposal once the lives of components are over. It is easier to recycle a metallic component than a polymer matrix composite. Environmental engineering includes the drainage system, green building, and weather monitoring. Mechanical engineering subjects like fluid mechanics, heat transfer, and thermodynamics are finding increasing application in environmental engineering.

Another emerging field is the biomedical engineering. It is the application of engineering principles and design concepts to medicine and biology for healthcare purposes (Bronzino 2000). It is the combination of medical science and engineering. Many medical devices, like pacemaker, need the expertise of mechanical and electronics engineering for their design. A subject biomechanics has emerged. It is the study of the structure and function of biological systems such as humans, animals, plants, organs, and cells by means of the methods of mechanics (Hall 2011). Biomechanics is useful in designing implants. Apart from mechanics, material science plays an important role in identifying a suitable biocompatible material. In sports, biomechanics helps in reducing sport injuries by training the sport person for proper movement of the body and proper design of sports implements. Biofluid mechanics studies the behavior of body fluid movement such as blood. Such type of study is helpful in the treatment of many diseases such as heart disease. Microfluidics is also finding application in the diagnostics. Using the principle of microfluidics, one can find the level of blood sugar. Thus, mechanical engineering is finding its presence across the gamut of life.

1.8 Changes in Mechanical Engineering Education Through Ages

In the beginning, craftsmen-based courses were dominant in mechanical engineering curriculum. Machine drawing and workshop were the two important courses. Graphical methods of analysis were employed. After the World War II, there was a drastic change in engineering curricula. The importance of basic science courses was recognized. Gradually, electronics was applied to mechanical engineering products. The first numerical control (NC) milling machine was developed at MIT in 1952 (http://www.mfg.mtu.edu/cyberman/machtool/auto/nc/intro.html).

In the 1960s, mechanical engineering curriculum included computer programming. The mainframe machines were used for computing. In 1980s, PCs gained popularity. A significant portion of the mechanical engineering curriculum got filled with computational courses. In 1990s, the more emphasis has been on using the software rather than developing the codes. Modern trend is toward micro- and nano-engineering, green engineering, and synthetic biology. The subjects like quantum mechanics are expected to gain importance.

Developments in the field of computer science and information have greatly influenced the education of mechanical engineering. Ray Tomlinson invented e-mail in 1971, which helped in the exchange of information between two remotely located institutions. Internet came into existence in around 1973. However, it could not become much popular until the advent of the World Wide Web (WWW) (Isaacson 2014). It was announced by Tim Berners-Lee in 1991. Web is a convenient way of accessing and transmitting information through Internet. Nowadays, a lot of teaching materials including videos are available on Internet, which contributes a lot to mechanical engineering education.

1.9 Conclusion

In this chapter, an introduction to mechanical engineering has been provided. One has to understand the mechanical engineering from a professional as well as educational point of view. Although mechanical engineering has been in existence since the time immemorial, it took a formal shape in nineteenth century in the form of profession and education. The seeds of formal form of mechanical engineering were planted during industrial revolution. As the technology is progressing, the form of mechanical engineering is changing. Today, computer, electronics and electrical engineering are intermingled with the mechanical engineering. Primarily mechanical processes are getting replaced by chemical and biological processes. In that sense, importance of interdisciplinary research is increasing. However, the basic nature of mechanical engineering remains the same. It deals with the development and deployment of machines for human comfort.

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