ENGINEERING

Q. What is Engineering?

Engineering (*en je-nir-ing, n.*) is the art of applying scientific and mathematical principles, experience, judgment and common sense to make things that benefit people. Engineers design bridges and life-saving medical equipment, as well as the processes for cleaning up toxic spills and systems for mass transit. In other words, engineering is the process of producing a product or system.

According to Oxford Advanced Learner's Dictionary, ***Engineer*** is a person who designs, builds or maintains engines, machines, bridges, railways, mines etc and ***engineering*** is the practical application of scientific knowledge in the design, construction and control of machines, public services such as roads, bridges etc, electrical apparatus, chemicals etc. Engineering is the work, science or profession of an engineer.

In 1982, the Annual Report of ABET (Accreditation Board of Engineering and Technology) of USA defined Engineering as: "the profession in which a knowledge of the mathematical and natural sciences gained by the study, experience and practice is applied with judgment to develop ways to utilise, economically, the materials and forces of nature for the benefit of mankind". Today, this definition encompasses the usage of IT in facilitating the acquisition and application of such knowledge. IT has become an essential part of our lives, and thus should not be seen as an end in itself, but as a necessary means to an end, namely the effective and efficient utilisation of limited resources for the benefit of mankind.

Q. Who should study Engineering?

Only those who excel in science and love to innovate new gadgets/instruments/ equipments etc for the benefit of mankind will succeed in Engineering Education. Merely acquiring a BE/B.Tech. degree is not enough. Engineering is a lifelong education and engineers shall continue to keep abreast of the technology and contribute towards technology advancement. A solid foundation of classical theories is prerequisite to understanding of the state-of-the-art technologies.

A person must demonstrate the following to become an engineer in true sense:

a. an ability to apply knowledge of mathematics, science, and engineering
b. an ability to design and conduct experiments, as well as to analyze and interpret data
c. an ability to design a system, component, or process to meet desired needs
d. an ability to function on multi-disciplinary teams
e. an ability to identify, formulate, and solve engineering problems
f. an understanding of professional and ethical responsibility
g. an ability to communicate effectively
h. the broad education necessary to understand the impact of engineering solutions in a global and societal context
i. a recognition of the need for, and an ability to engage in life-long learning
j. a knowledge of contemporary issues
k. an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Q. What are the different stages of Engineering Education in India?

Post-Matric Technical Education - Diploma level courses for the training of middle level man power needed for a wide range of professional duties, for application of knowledge in field operation, in production and construction, testing and development etc., and such functions are offered in 291 polytechnics with an annual enrolment capacity of about 50,000 students. They offer a variety of specialization in engineering and technology as well as in a few non- technological fields. The courses are normally of three years duration where full-time institutional instruction is offered and 31/2 to 4 years when instruction is on a Sandwich or on part-time basis. Recently a number of diversified courses and facilities for evening part-time education have also been provided in some polytechnics situated in metropolitan cities where the demand for such courses exists.

About two dozen Women Polytechnics with courses of special interest to, and employment potential for, women, have also been established, particularly to cater to the needs of the socially/ economically inhibited classes who might be reluctant to take advantage of the facilities generally available in the regular polytechnics.

The products of the diploma courses are expected to take up supervisory positions in field and industry.

Degree level-For the professional engineers and technologists, facilities for technical education are available in 1200+ engineering colleges offering courses leading to the award of Bachelor Degree in Engineering and Technology. The total admission capacity annually for these courses is of the order of 200000. The duration of most of these degree courses was initially five years and with the new pattern of Secondary Education of 10+2, change over completely by 1981-82 to a duration of four years (except architecture).

Post-Graduate Courses-For the benefit of those who have higher level academic achievements as also for under taking research and development activities in engineering and technology, post- graduate courses have been offered widely in the various selected institutions offering degree courses. The number of the institutions offering such post-graduate courses is about 100 with an annual intake capacity of about 2,000+. These courses normally lead to the Master's Degree in the concerned discipline and are of two years/one and half-year duration. Facilities also exist at these centres offering part-time courses at the Post- graduate level for those who are already in service. Duration of such courses normally is three years.

INSTITUTIONAL FRAMEWORK

As has been mentioned above, the Vocational Training/Craftsmen Courses are offered at the Industrial Training Institutes. The Diploma courses are offered in the Polytechnics which are widely spread over all the States and Union Territories and are affiliated to the respective State Boards of Technical Education who lay down in general the levels and standards of the courses and guide the system of evaluation of the students appearing at the examination. Degree and Post-Graduate courses are offered in colleges affiliated to the various Universities, certain University Departments, and institutions declared as of national importance or as deemed Universities.

Indian Institutes of Technology- These are our apex institutions for engineering education and research. Each Institute conducts a First degree course and Master's Degree course in a wide range of subject fields, and also offers facilities for Research and Doctoral work. The main emphasis at the Institutes is on the Post-Graduate studies and Research with an inter-disciplinary approach. To this end each Institute has developed good departments of Physics, Chemistry, Mathematics, and Social Sciences which inter-act with the departments of Engineering and Technology. The student enrolment at the Institutes at the Undergraduate level is limited to 1250 and admission at the Post-Graduate level is designedly kept at about the same order as in the under-graduate courses. The Institutes are in various stages of consolidation and development. As part of the national plan of science and technology, five Centres of Advanced Study and Research have been set up in the Indian Institutes of Technology in Energy Studies (Delhi), Material Science (Kanpur), Cryogenic Engineering (Kharagpur), Ocean Engineering (Madras) and Resource Engineering (Bombay).

Indian Institute of Science, Bangalore- The Indian Institute of Science, Bangalore the oldest and leading post-graduate and research centre in Science and Engineering has facilities in special fields which include Electronics and Communication Engineering, Aeronautical Engineering, Heat and Power Engineering, High Voltage Engineering, Power Engineering, Bio-Chemistry, Chemistry, Physics and Mathematics. A major Centre in Automation and Control Systems and another in Electronics Design Technology are in the process of establishment.

The National Institutes of Technology (**NIT**s), is an engineering, science, technology and management school system in India comprising thirty autonomous institutions located in one each major state/territory of India. Since their inception decades ago, all NITs were referred as *Regional Engineering Colleges* (RECs) and were governed by their respective state governments. A parliamentary legislation in 2002 brought them under the direct purview of India's federal government. In 2007, through legislation, the Indian government declared these schools as Institutes of National Importance at par with the Indian Institutes of Technology. NITs were founded to promote regional diversity and multi-cultural understanding in India. Therefore, in the NIT school system, half of the student population in each batch is drawn from the respective state of the NIT and the other half is drawn from the rest of India on a common merit list. This is different than the Indian Institutes of Technology or IITs - another prominent engineering school system in India. An IIT need not accept specified number of students from any region of India as the IIT admission criteria is based only on the performance of a student in an entrance examination. NITs offer degree courses at bachelors, masters, and doctorate levels in various branches of engineering and technology. Various nationwide college surveys rate most of the NITs over other colleges in India, except for the IITs and a few other institutions. NITs function autonomously, similarly to IITs, sharing only entrance tests. The autonomy enables the NITs to set up their own curriculum, thereby making it easier to adapt to changing industry requirements.

State Colleges and University Departments - In addition to the above institutions offering courses at degree and post-graduate level, there is a wide net work of engineering colleges established and administered by the State Governments, Universities and private agencies; they are also affiliated to the respective Universities, and offer degree courses in a variety of subject fields. Some of them are more than a century old and have been pioneers in engineering education in the country. Many of these State colleges and University Departments are making significant contribution in the field of technical education.

Special Institutions - In additions to the above institutions there are certain specialised institutions which offer education/training in specific fields-

National Institute for Training in Industrial Engineering, Bombay - offers a two years post-graduate programme in Industrial Engineering as also a number of Executive Development Programmes and Unit based programmes in various areas of specific interest to specific employing agencies.

National Institute of' Foundry and Forge Technology, Ranchi - offers a special post-graduate training programme of 12-18 months duration in Advanced Foundry and Forge techniques for personnel from the industry.

Indian School of Mines, Dhanbad - which has been declared a deemed University is a specialised Centre for Undergraduate and Post- graduate studies and research in Mining, Applied Geology, Petroleum Technology and Geo-Physics.

Other Institutions - There are also other institutions offering courses in architecture and town planning (such as School of Planning and Architecture at New Delhi which offers degree course in Architecture and Post-graduate course in Town Planning with specialisation in Urban Design, Housing and Community Planning, Transportation and Traffic Engineering). Sugar Technology. (National Institute of Sugar Technology, Kanpur), Food Technology Industrial Design (National Institute of Industrial Design, Ahmedabad), Marine Engineering (College of Marine Engineering, Bombay), etc.

Q. What is All India Council of Technical Education (AICTE)?

All India Council for Technical Education (AICTE) was set-up in November 1945 as a national level Apex Advisory Body to conduct survey on the facilities on technical education and to promote development in the country in a coordinated and integrated manner. And to ensure the same, as stipulated in, the National Policy of Education (1986), AICTE be vested with statutory authority for planning, formulation and maintenance of norms and standards, quality assurance through accreditation, funding in priority areas, monitoring and evaluation, maintaining parity of certification and awards and ensuring coordinated and integrated development and management of technical education in the country.

The purview of AICTE (the Council) covers programmes of technical education including training and research in Engineering, Technology, Architecture, Town Planning, Management, Pharmacy, Applied Arts and Crafts, Hotel Management and Catering Technology etc. at different levels.

Q. Why should I choose Engineering as a Career?

Engineering is the most versatile profession one can opt as a career. In fact engineering degree is so versatile that you can enter any area of economy whether it is banking, administrative service, tourism, defense service and many more in addition to main stream engineering profession. Unlike other professions, knowledge of the nature of engineering, and the role of engineers, is concerned with the design and production of so many objects, devices, and systems which are an integral part of our environment and day to day life. These systems are as vital to society as are our school, health care, and legal systems. Engineers probably have a wider choice of environment in which to work, and a greater variety of jobs, than is possible in any other profession.

The purpose of engineering is to design and manufacture the hardware of life and make it comfortable. From bicycle to aeroplane to television to computer all adds to the quality of life we are living today. More over engineering profession is rewarding-socially as well as economically. An engineer has a place of pride in the society and country. Engineers are always among the highest paying executive in any industry or organization. There are ample opportunities for growth and innovation in the engineering profession. So if you are interested in innovating new things which has practical and commercial utility certainly engineering is your profession.

The engineering profession is flourishing in today's society, which is increasingly dependent on accelerating technology. There are a record 2 million engineers in the United States, making the engineering profession the second largest in the nation. And companies are hiring! In short, it a seller's market for engineers.

Employment opportunities in engineering are expected to be plentiful through the year 2011 and beyond. That's because employment is expected to increase about as fast as the average for all occupations while the number of degrees granted in engineering is expected to remain near present levels. An engineering degree also opens doors to other careers. Engineering degree is the most versatile degree available in the present day education system in country like India. New generation careers like IT, Biotechnology, Bioinformatics, and Genetic Engineering etc are more suitable to students with engineering back ground than any other back ground. Many engineering graduates move into other professions, such as administrative service, medicine, law and business, where an engineering background is a valuable asset.

Q. How can I become an Engineer in India?

In our country to become an engineer, one has to acquire a qualification in engineering from any of the recognized institution. As discussed earlier there are three levels of engineering courses available at engineering institutions in the country.

- Degree (BE/B.Tech etc) and post graduate degree courses offered by engineering colleges (both in government and private sector), universities, National Institute of Technology (NIT) and Indian Institute of Technology (IIT)
- Diploma courses offered by polytechnics
- Training in engineering skills offered by Industrial Training Institutes (ITI)

Over and above the BE/B.Tech. programs conducted by engineering colleges/ NITs/IITs and other central institutes, there are professional bodies recognized by government of India to award AMIE (Associate Member of Institution of Engineers) equivalent to any degree in engineering to cater mainly to working people in the private and public sectors. Student who cannot join a engineering college due to any reason can complete a diploma in engineering from any of the polytechnics and then join an engineering college through lateral entry scheme or can complete AMIE to become equivalent to a BE/B.Tech degree holder in engineering. However our discussion in the book shall be limited to degree level courses (BE/B.Tech) in engineering.

To join an engineering college in our country a student has to opt science stream after High School Leaving Certificate Examination (class X examination) at Higher Secondary (10+2) level with subjects such as Physics, Chemistry, Mathematics, Computer Science, Biology, Biotechnology and Engineering Drawing etc. Though majority of the branches of engineering colleges needs Mathematics, Physics and Chemistry as compulsory subjects at (10+2) level, some of the branches also admit student having Mathematics and Physics as compulsory subject and any one of Chemistry/Computer Science/ Biology/ Biotechnology /Engineering Drawing as the third subject.

Science student after completing B.Sc. with major in Physics/Chemistry/ Mathematics can also join any of the 3 years B.Tech program in engineering offered by some institutions/universities. More over students can also complete M.Sc. in electronics/ radio physics/ Information Technology etc and join the engineering profession. However entering the engineering college after (10+2) and acquiring the B.Tech/B.E to join the engineering profession is the most popular route to become an engineer.

Q. What is Aeronautical Engineering?

Aeronautical engineering is the branch of engineering that deals with study or practice of flying and navigating aircraft. Aeronautical engineers design, develop or produce new commercial or military aircraft; develop more powerful but also more eco-friendly jet engines.

Some of the elements of aeronautical engineering are:

Aerodynamics - the study of fluid flow around objects such as wings or through objects such as wind tunnels.

Propulsion - the energy to move a vehicle through the air (or in outer space) is provided by internal combustion engines, jet engines, or rockets.

Control engineering - the study of mathematical modelling of systems and designing them in order that they behave in the desired way

Structures - design of the physical configuration of the craft to withstand the forces encountered during flight. Aerospace engineering aims very much at keeping structures lightweight.

Materials science - related to structures, aerospace engineering also studies the materials of which the aerospace structures are to be built. New materials with very specific properties are invented, or existing ones are modified to improve their performance.

Aero elasticity - the interaction of aerodynamic forces and structural flexibility, potentially causing flutter, divergence, etc.

Computer science - specifically concerning the design and programming of any computer systems on board an aircraft or spacecraft and the simulation of systems.

Q. What is Aerospace Engineering?

Aerospace engineering encompasses the fields of aeronautical and astronautical (spacecraft) engineering. Aerospace engineers are concerned with the design, analysis, construction, development, testing and manufacture of commercial and military aircraft, missiles and spacecraft. Aerospace engineers have specialties in aerodynamics, propulsion, thermodynamics, structures, celestial mechanics, acoustics and guidance and control systems. For aerospace engineers employment is available with Air India, Indian Airlines, Pawan Hans, Helicopter Corporation of India and flying clubs, private airlines and govt. owned air services etc. Besides airlines, they get employment in organizations such as HAL, Defense Research and Development Organisation and laboratories, National Aeronautical Lab, Aeronautical Development Establishment & Civil Aviation Department, to name a few. With the rise in the number of air taxis and liberalization of airspace, avenues for aeronautical engineers have seen upward swing.

Q. What is Agricultural Engineering?

This is the branch of engineering that deals with design and development of farm machineries and other implements related to agriculture, processing of agricultural products etc. With entry of high-tech entering the agricultural engineering, Satellites will improve agriculture, resource management and you can think of it as micromanagement from the heavens. Global positioning systems, says Bernie Engel, a Purdue professor in agricultural and biological engineering, use satellite signals to help determine where we're at on the ground. When used with geographical information systems, these systems can provide a tremendous amount of detail about soil, air, and other spatially varying parameters. Engel says site-specific agriculture is already heading in that direction. So rather than viewing a 40-acre field as a whole, it can be examined on a scale of acres or even square feet. By combining various data about soils, for example, farmers can predict where they may need to apply fertilizer or pesticide or where they're likely to have an erosion problem. Computers will also suggest specific, appropriate action. "There are lots of implications in agriculture and natural resources management," Engel says, "Forests, grasslands and ranges can be monitored this way, too."

A large percentage of agricultural engineers work in academia or for government agencies such as the States Department of Agriculture or state agricultural extension services. Agricultural engineers work in production, sales, management, research and development, or applied science.

Q. What is Automobile Engineering?

Automobile engineering is the branch of engineering that deals with design, development, manufacture and repair of automobiles. Matthew Franchek, a Purdue University professor of mechanical engineering, says he believes that engines in the future will be able to continuously monitor their own health. Within 10 years, he predicts, an automobile will communicate with its driver and with service personnel to request maintenance. Furthermore, relying on global positioning satellites, individual cars will be able to communicate on-the-road emergency needs during vehicle failures. Emergency road crews will be able to pinpoint the stalled vehicle and know precisely what parts are needed to repair it.

Q. What is Architectural Engineering?

Architectural engineering is the application of engineering principles to the design of technical systems of buildings. The profession of architectural engineering includes practicing engineers designing, managing and constructing mechanical, electrical or structural systems for buildings. Architecture combines technicality with aesthetics and creativity. An architect's job is to create landscapes and design buildings, roads and bridges or even townships. Needless to say, architects play an important role in society's development.

Q. What is Bioinformatics?

Bioinformatics is an engineering discipline at the convergence of computing and the life sciences aimed at development of technologies for storing, extraction, organizing, analyzing, interpreting and utilizing the information being generated. It is truly an interdisciplinary field. The potential employers for bioinformatics graduates includes: Specialized bioinformatics companies. Pharmaceutical and biotech companies employing bioinformatics technology in all the stages of the drug discovery process.A biotech/ industrial biotech companies using bioinformatics for study of crops and livestock. Computing companies building specialized hardware and software for bioinformatics. Other potential employers include academic research groups. govt. agencies such as patent offices etc. The terms *bioinformatics* and *computational biology* are often used interchangeably, although the former typically focuses on algorithm development and specific computational methods, while the latter focuses more on hypothesis testing and discovery in the biological domain. Although this distinction is used by National Institutes of Health in their working definitions of Bioinformatics and Computational Biology, it is clear that there is a tight coupling of developments and knowledge between the more hypothesis-driven research in computational biology and technique-driven research in bioinformatics. Computational biology also includes lesser known but equally important subdisciplines such as computational biochemistry and computational biophysics.

A common thread in projects in bioinformatics and computational biology is the use of mathematical tools to extract useful information from noisy data produced by high-throughput biological techniques such as genomics (The field of data mining overlaps with computational biology in this regard). A representative problem in bioinformatics is the assembly of high-quality DNA sequences from fragmentary "shotgun" DNA sequencing, while in computational biology, a representative problem might be statistical testing of a hypothesis of common gene regulation using data from mRNA microarrays or mass spectrometry.

Q. What is Biomedical Instrumentation Engineering?

With the introduction of sophisticated diagnostic and life support medical equipment currently used for medical investigations, during open heart surgery, dialysis etc. in modern hospitals throughout the country, the need was felt for well trained personnel with knowledge of both the human system and technology of the instruments used, and who would thus understand and be able to handle such equipment with necessary skill, confidence and expertise. The objective of this course/field is to impart all possible applications of bio-medical instrumentation, its technology and its use and intelligent operations.

Q. What is Biotechnology?

Biotechnology is the industrial and pharmaceutical application of cell and molecular biology. It is a major growth industry worldwide, with exciting new developments in medicine, agriculture, horticulture, forensic science and microbiology, and it offers increasing opportunities for graduates with biotechnology knowledge and skills. Applied biotechnology involves introducing new genes into organisms, breeding organisms to form new variants or treating organisms with specific compounds.

Q. What is Biological Engineering?

It is a broad-based engineering discipline that deals with bio-molecular and molecular processes, product design, sustainability and analysis of biological systems. Generally, bioengineering encompasses other engineering disciplines when they are applied to living organisms (e.g., prosthetics in mechanical engineering). Bioengineering is often synonymous with biomedical engineering, though in the strict sense the term can be applied more broadly to include food engineering and agricultural engineering. Biotechnology also falls under the purview of the broad umbrella of bioengineering.

Biological Engineering is the same thing as Agricultural Engineering, whereas Biomedical engineering (also known as bioengineering) is related with the medical field. Biological engineering is called Bioengineering by some colleges and Biomedical engineering is called Bioengineering by others. Therefore, people could easily get confused.

Q. What is Biochemical Engineering?

Biochemical engineering is a branch of chemical engineering that mainly deals with the design and construction of unit processes that involve biological organisms or molecules. Biochemical engineering is often taught as a supplementary option to chemical engineering due to the similarities in both the background subject curriculum and problem-solving techniques used by both professions. Its applications are used in the pharmaceutical, biotechnology, and water treatment industries.

Bio-chemical engineering has two central domains: (i) processing of biological materials and (ii) processing using biological agents as living cells, enzymes or antibodies. Biochemical engineering is an interdisciplinary field: (i) it requires integrated knowledge of governing biological properties and as well as (ii) of chemical engineering methodology and strategies. This branch captures the information and technologies from both areas and accomplishes new synthesis for bioprocess design, operation, analysis and optimization. Classic topics of biochemical engineering are design and analysis of bioreactors, biomass production in cell cultures, instrumentation and control of bioprocesses and bio-product recovery. Recent developments are metabolic engineering and bio-systems technology.

Q. What is Biomedical Engineering?

Biomedical Engineering is the application of engineering principles and techniques to the medical field. It combines the expertise of engineering with medical needs to improve healthcare. It is a less known discipline than other specialties such as electrical engineering or mechanical engineering. An increasing number of universities with an engineering faculty now have a biomedical engineering program or department from the undergraduate to the doctorate level. Traditionally, biomedical engineering has been an interdisciplinary field to specialize in after completing an undergraduate degree in a more traditional discipline of engineering or science. However, undergraduate programs are becoming more widespread.

Research and development is the most common line of work for biomedical engineers and covers a very wide array of fields: bioinformatics, medical imaging, image processing, physiological signal processing, biomechanics, biomaterials, systems analysis, 3-D modeling, etc. Examples of concrete applications of biomedical engineering are the development and manufacture of prostheses, medical devices, diagnostic devices and imaging equipement, laboratory equipment, drugs and other therapies as well as the application of engineering principles to biological science problems.

Clinical engineering is a branch of biomedical engineering for professionals responsible for the management of medical equipment in a hospital. The tasks of a clinical engineer are typically the acquisition and management of medical device inventory, supervising biomedical engineering technicians (BMETs), ensuring that safety and regulatory issues are taken into consideration and serving as a technological consultant for any issues in a hospital where medical devices are concerned. Clinical engineers work closely with the IT department and medical physicists.

Q. What is Chemical Engineering?

Chemical engineering applies principles of chemistry and physics to the design and production of materials that undergo chemical changes during their manufacture. Chemical engineer also participates in efforts to maintain a clean environment and to create substitutes for or find ways to preserve our natural resources.

The activities of a chemical engineer are in many fields like petroleum refining, fertilizer technology, processing of food and agricultural products, synthetic food, petrochemicals, synthetic fibres, coal and mineral based industries, and prevention and control of environmental pollution. Chemical engineers will be needed to develop new polymeric materials for medical devices, light-weight alloys for aircraft and solid-state materials that allow electronic miniaturization and further development of the computer industry. Improved health care also will require new manufacturing processes for pharmaceutical products.

Chemical engineering largely involves the design and maintenance of chemical processes for large-scale manufacture. **Chemical engineers** in this branch are usually employed under the title of **process engineer**.

Chemical engineers are aiming for the most economical process. This means that the entire production chain must be planned and controlled for costs. A chemical engineer can both simplify and complicate "showcase" reactions for an economic advantage. Using a higher pressure or temperature makes several reactions easier; ammonia, for example, is simply produced from its component elements in a high-pressure reactor.

Three primary physical laws underlying chemical engineering design are Conservation of mass, Conservation of momentum and Conservation of energy. The movement of mass and energy around a chemical process are evaluated using Mass balances and energy balances which apply these laws to whole plants, unit operations or discrete parts of equipment. In doing so, Chemical Engineers use principles of thermodynamics, reaction kinetics and transport phenomena. The task of performing these balances is now aided by process simulators, which are complex software models (such as Pro II and Hysys) that can solve mass and energy balances and usually have built-in modules to simulate a variety of common unit operations.

The modern discipline of chemical engineering encompasses much more than just process engineering. Chemical engineers are now engaged in the development and production of a diverse range of products, as well as in commodity and specialty chemicals. These products include high performance materials needed for aerospace, automotive, biomedical, electronic, environmental and military applications. Examples include ultra-strong fibers, fabrics, adhesives and composites for vehicles, bio-compatible materials for implants and prosthetics, gels for medical applications, pharmaceuticals, and films with special dielectric, optical or spectroscopic properties for opto-electronic devices. Additionally, chemical engineering is often intertwined with biology and biomedical engineering. Many chemical engineers work on biological projects such as understanding biopolymers (proteins) and mapping the human genome.

Q. What is Civil Engineering?

Civil engineering is the oldest branch of engineering and incorporates the design and construction of roads, airports, tunnels, bridges, water supply and sewage systems, dams harbours, railroad systems, docks, power supply systems, building and even nuclear power plants. Civil engineering offers areas of specialization such as structural engineering, highway engineering and water management.

Most civil engineering today deals with roads, Railways, structures, water supply, sewer, flood control and traffic. In essence, civil engineering is a profession which makes the world a more habitable place to live in.

Engineering has developed from observations of the ways natural and constructed systems react and from the development of empirical equations that provide bases for design. Civil engineering is the broadest of the engineering fields. In fact, engineering was once divided into only two fields--military and civil. Civil engineering is still an umbrella field comprised of many related specialties.

Sub-disciplines of civil engineering are:

General civil engineering

Structural engineering

Geotechnical engineering

Transportation engineering

Environmental engineering

Hydraulic engineering

Construction engineering

Urban engineering

General civil engineering is concerned with the overall interface of fixed projects with the greater world. General civil engineers work closely with surveyors and specialized civil engineers to fit and serve fixed projects within their given site, community and terrain by designing grading, drainage (flood control), paving, water supply, sewer service, electric and communications supply and land (real property) divisions. General engineers spend much of their time visiting project sites, developing community/neighborhood consensus, and preparing construction plans.

Structural engineering is concerned with the design of bridges, buildings, offshore oil platforms, dams etc. Structural design and structural analysis are components of structural engineering and a key component in the structural design process. This involves computing the stresses and forces at work within a structure. There are some structural engineers who work in non-typical areas, such as designing aircraft, spacecraft and even biomedical devices. Major design concerns are building seismic resistant structures and seismically retrofitting existing structures. In a practical sense, structural engineering is largely the application of Newtonian mechanics to the design of structural elements and systems: such as buildings, bridges, walls (including retaining walls), dams, tunnels, etc.

Structural engineers ensure that their designs satisfy a given design intent predicated on safety (i.e. structures do not collapse without due warning) and on serviceability (i.e. floor vibration and building sway are not uncomfortable to occupants). In addition, structural engineers are responsible for making efficient use of funds and materials to achieve these over-arching goals. Typically, entry-level structural engineers may design simple beams, columns, and floors of a new building, including calculating the loads on each member and the load capacity of various building materials (steel, timber, masonry, concrete). An experienced engineer would tend to render more difficult structures, considering physics of moisture, heat and energy inside the building components.

In the United States, the structural engineering field is often subdivided into bridge engineering and structural engineering for buildings. Additionally, structural engineers often further specialize into special structure manufacture or construction, such as pipeline engineering or industrial structures.

Structural loads on structures are generally classified as: live loads such as the weight of occupants and furniture in a building, the forces of wind or weights of water, the forces due to seismic activity such as an earthquake, dead loads including the weight of the structure itself and all major architectural components and live roof loads such as material and manpower loading the structure during construction Structural engineers mainly fight against the forces of nature like winds,earthquakes and Tsunamis. In recent years, however, reinforcing structures against sabotage has taken on increased importance.

Geotechnical engineering also known as soil mechanics is concerned with soil properties, mechanics of soil particles, compression and swelling of soils, seepage, slopes, retaining walls, foundations, footings, ground and rock anchors, use of synthetic tensile materials in soil structures, soil-structure interaction and soil dynamics. Geotechnical engineering covers this field of studies for application in engineering.

The importance of geotechnical engineering can hardly be overstated: buildings must be supported by reliable foundations. Dam design and construction reducing flooding of lower drainage areas is an important subject of geotechnical engineering.

Transportation engineering is primarily concerned with motorized road transportation. This includes areas such as queueing theory and traffic flow planning, roadway geometric design and driver behavior patterns. Simulation of traffic operation is performed through use of trip generation, traffic assignment algorithms which can be highly complex computational problems. Other specialized areas of transportation engineering deal with the designs of non-road transportation facilities, such as rail systems, airports, and ports.

Environmental engineering deals with the treatment of chemical, biological, and/or thermal waste, the purification of water and air, and the remediation of contaminated sites, due to prior waste disposal or accidental contamination. Among the topics covered by environmental engineering are water purification, sewage treatment, and hazardous waste management. Environmental engineering is related to the fields of hydrology, geohydrology and meteorology insofar as knowledge of water and groundwater flows is required to understand pollutant transport. Environmental engineers are also involved in pollution reduction, green engineering, and industrial ecology. Environmental engineering also deals with the gathering of information on the environmental consequences of proposed actions and the assessment of effects of proposed actions for the purpose of assisting society and policy makers in the decision making process.

Environmental engineering is the contemporary term for sanitary engineering. Some other terms in use are public health engineering and environmental health engineering.

Hydraulic engineering is concerned with the flow and conveyance of fluids, principally water. This area of engineering is intimately related to the design of pipelines, water distribution systems, drainage facilities (including bridges, dams, channels, culverts, levees, and storm sewers), canals, and to environmental engineering. Hydraulic engineers design these facilities using the concepts of fluid pressure, fluid statics, fluid dynamics, and hydraulics, among others.

Construction engineering involves planning and execution of the designs from transportation, site development, hydraulic, environmental, structural and geotechnical engineers.

Urban engineering is a subset of the general practice of urban planning. It is limited to civil engineering in an urban setting and does not include designing buildings or their functions.

Q. What is Computer Science and Engineering?

This course is concerned with theoretical and engineering aspects of computer architecture, system and application software, computer networks, VLSI, internet technology and applications. Adequate emphasis is also given to programming, algorithm design and analysis, formal languages and automata theory, and theoretical computer science. **Computer Engineering** is a discipline encompassing electronic engineering and computer science. This hybrid of electronic engineering and computer science allows the computer engineer to work on both software and hardware, and to integrate the two. Computer engineers are involved on all aspects of computing, from the design of individual microprocessors, personal computers, and supercomputers, to the integration of computer systems into other kinds of systems (a motor vehicle, for example, has a number of subsystems that are computer and digitally oriented). Electronic equipment today relies very heavily on computer technology and so electronic engineers and computer engineers may work together to design and manufacture electronic equipment which requires both hardware and software design. Common computer engineering tasks include writing embedded software for real-time microcontrollers, designing VLSI chips, working with analog sensors, designing mixed signal circuit boards, and designing operating systems.

Computer engineering will draw an increasing number of students who have an interest in the design of computer hardware and software. According to the Bureau of Labor Statistics estimates, computer engineering will become the second-largest engineering field.

Q. What is Ceramic Engineering?

This branche of engineering deals with composition and behavior of materials. The strength of materials under different kind of load conditions is studied. New materials can be produced as per requirement by combining different materials & their properties. The multibillion-dollar ceramic industry converts processed materials and raw materials taken directly from the earth (clay, sand, etc.) into such useful products as spark plugs, glass, electronic components, nuclear materials, abrasives, rocket components, and even tableware. High-temperature processing is the key to ceramic engineering, and the products are always inorganic, nonmetallic solids. From a single chemical source, ceramic engineers make useful materials in many forms. Carbon as diamond is used as an abrasive for grinding; carbon in the form of graphite is used for lubrication, as glass for crucibles, and as fiber for cloth. Career Opportunities are in abundance in this field in various areas , like in building space shuttles, producing ceramics teethes, bones and joints, making ultra fast computer systems, in fiber optic cables etc.

Q. What is Dairy Technology?

The efficient and hygienic production and distribution of dairy products come in the purview of diary technology. Dairy Technologists apply the knowledge of various other sciences such as bacteriology, chemistry, physics, economics and engineering to the production, preservation and distribution of dairy products.

Q. What is Electrical Engineering?

Electrical engineers are concerned with the generation, distribution and use of electrical power and power control. Electrical engineers work with equipment that produce and distribute electricity such as generators, transmission lines, transformers, lighting and wiring in buildings. In fact, electrical engineers are involved in the practical application of electrical energy. Electrical engineers find jobs in power plants whether thermal, hydro or nuclear. They have job opportunities in industries like the railways, construction, civil aviation and all types of manufacturing plants.

More than a quarter of all engineers concentrate in electrical engineering. The demand for electrical engineers is expected to remain high due to projected growth in the aerospace, telecommunications and microelectronics industries.

Q. What is Electronics Engineering?

Branch of engineering that deals with the behavior of electron and application of this in developing equipments Electronics engineer study and use systems that operate by controlling the flow of electrons (or other charge carriers) in devices such as thermionic valves and semiconductors. The design and construction of electronic circuits to solve practical problems is part of the field of electronics engineering, and includes the hardware design side of computer engineering.

Q. What is Environmental Engineering?

Environmental engineering is the branch of interdisciplinary engineering which deals with the protection of environment and developing equipments for reducing air, water pollution and instruments for monitoring pollution etc. Negative environmental effects can be decreased and controlled through public education, conservation, regulations, and the application of good engineering practices.

Q. What is Energy Engineering?

Energy engineering is a broad field of engineering dealing with energy efficiency, energy services, facility management, plant engineering, environmental compliance and alternative energy technologies. Domain of Energy Engineering expertise combines selective subjects from the fields Chemical, Mechanical and Electrical Engineering. It is an interdisciplinary program which has relativity with electrical, mechanical and chemical engineering. Energy minimization is the purpose of this growing discipline. Often applied to building design, heavy consideration is given to HVAC, lighting, refrigeration, to both reduce energy loads and increase efficiency of current systems. Energy Engineering is increasingly seen as a major step forward in meeting carbon reduction targets. **Energy Technology** refers to the knowledge of and usage skills required for conversion, production, transfer, distribution and use of energy. This leads to the mastering of technology based on the laws of nature, as a result of which different forms of energy can be used to serve the needs of mankind in such a way that nature is spared and the economic resources of society are taken into consideration.

Q. What is Food Technology?

Food technology is a field that has witnesses much advanced in recent years. The food industry has responded positively to this by developing new technology to cater to the new needs of the consumer market. Food technologist develops new methods for processing, preservation and packaging of foodstuffs and evaluating their nutritional value.

Q. What is Food Processing Technology /Food Processing & Preservation Technology?

This is the latest area where lot of manpower is needed these days. World is fast moving towards processed, ready to eat food products. Tinned or packed food is the example of those opportunities of employment exists in Food processing Industries supply of packed / tinned food to Airlines, Defence and other places besides local market. Food Science and Technology is the Application of Science, Technology and Engineering to the Production, Marketing, Distribution and Utilisation of Foods. To encourage education, investigation and research in all aspects of food science and technology to support improvement of the food supply and its use through science, technology and education. Job Opportunities are available in various food concerns like Pepsi foods , Pepsi Co India , Nestle etc

Q. What is Fire Engineering?

This branch of engineering deals with fire protection and design, development of fire protection equipment and process etc. It involves the study of the behaviour, compartmentalisation, suppression and investigation of fire and its related emergencies as well as the research and development, production, testing and application of mitigating systems. In structures, be they land-based, offshore or even ships, the owners and operators are responsible to maintain their facilities in accordance with a design-basis that is rooted in laws, including the local building code and fire code, which are enforced by the Authority Having Jurisdiction. Buildings must be constructed in accordance with the version of the building code that is in effect when an application for a building permit is made. Building inspectors check on compliance of a building under construction with the building code. Once construction is complete, a building must be maintained in accordance with the current fire code, which is enforced by the fire prevention officers of a local fire department. In the event of fire emergencies, Firefighters, fire investigators, and other fire prevention personnel called to mitigate, investigate and learn from the damage of a fire. Lessons learned from fires are applied to the authoring of both building codes and fire codes.

Q. What is Information Technology (IT)?

Information technology (IT) is an evolving interdisciplinary field that is driven and shaped by the rapid development of computing. Communication and Internet based technologies and their tremendous impact on our daily lives. In contrast to the more traditional information systems discipline, information technology deals with the development, utilization, inter-relation and confluence of computers, networking, telecommunication, business and technology management in the context of the global Internet. As we enter the information Age of the 21st century, society will be increasingly dependent on information technology, and demand for IT professionals will remain high throughout the decades to come.

In particular, IT deals with the use of electronic computers and computer software to convert, store, protect, process, transmit, and retrieve information. For that reason, computer professionals are often called **IT specialists**, and the division of a company or university that deals with software technology is often called the **IT department**. Other names for the latter are information services (IS) or management information services (MIS), managed service providers (MSP).

Information technology (IT) or **Information and communication(s) technology** (ICT) (also **Infocomm**) is a broad subject concerned with technology and other aspects of managing and processing information, especially in large organizations.

Q. What is Industrial Engineering?

Industrial Engineering: studies the production resources of an industry-i.e, people, materials, information, fuel, energy etc. and ensures the effective utilization of these in the production process. The Industrial engineer interfaces between the management and operations sectors in order to ascertain the proper use of available industrial resources. Industrial engineering draws upon the principles and methods of engineering analysis and synthesis, as well as mathematical, physical and social sciences together with the principles and methods of engineering analysis and design to specify, predict and evaluate the results to be obtained from such systems. Industrial engineers work to eliminate wastes of time, money, materials, energy and other resources.

Industrial Engineering is also known as Operations Management, Production Engineering, Manufacturing Engineering or Manufacturing Systems Engineering; a distinction that seems to depend on the viewpoint or motives of the user. Recruiters or Educational establishments use the names to differentiate themselves from others. In healthcare Industrial Engineers are more commonly known as Management Engineers Engineering management, or even Health Systems Engineers.

Whereas most engineering disciplines apply skills to very specific areas, industrial engineering is applied in virtually every industry. Examples of where industrial engineering might be used include shortening lines (or queues) at a theme park, streamlining an operating room, distributing products worldwide, and manufacturing cheaper and more reliable automobiles.

The name "industrial engineer" can be misleading. While the term originally applied to manufacturing, it has grown to encompass services and other industries as well. Similar fields include operations research, systems engineering, ergonomics and quality engineering. The unicist approach to engineering considers industry as a complex system.

There are a number of things industrial engineers do in their work to make processes more efficient, to make products more manufacturable and consistent in their quality, and to increase productivity.

Q. What is Instrumentation Engineering?

Instrumentation Engineering is concerned with the development and maintenance of instrument systems in industries. **Instrumentation** is defined as the art and science of measurement and control. An instrument is a device that measures and/or regulates physical quantity/process variables such as flow, temperature, level, or pressure. Instruments include many varied contrivances that can be as simple as valves and transmitters, and as complex as analyzers. Instruments often comprise control systems of varied processes such as refineries, factories, and vehicles. The control of processes is one of the main branches of applied instrumentation. Instrumentation can also refer to handheld devices that measure some desired variable. Diverse handheld instrumentation is common in laboratories, but can be found in the household as well. For example, a smoke detector is a common instrument found in most western homes. Output instrumentation includes devices such as solenoids, valves, regulators, circuit breakers, and relays. These devices control a desired output variable, and provide either remote or automated control capabilities. These are often referred to as final control elements when controlled remotely or by a control system.

Q. What is Mechanical Engineering?

Mechanical engineering applies the principles of mechanics and energy to the design of machines and devices. These engineers are concerned with the design, operation and maintenance of machines, their components, machine tools, manufacturing systems and processes. Perhaps the broadest of all engineering disciplines, mechanical engineering is generally combined into three broad areas: energy, structures and motion in mechanical systems, and manufacturing. Mechanical engineers work for a wide array of manufacturing and design firms. Almost every large technical or manufacturing company has a need for mechanical engineers. Manufacture's utilities and consulting firms large and small hire mechanical engineers. Mechanical engineers are expected to lead the revolution taking place in manufacturing processes, in which defects are eliminated and greater efficiencies achieved.

The major divisions of mechanical engineering are designs and controls, thermo-science and fluids, engineering mechanics, and manufacturing. Depending on the colleges and the universities, some mechanical engineering programs offer more specialized programs, such as mechatronics, robotics, transport and logistics, cryogenics, and biomechanics, if a separate department does not exist for these subjects.

Modern analysis and design processes in mechanical engineering are aided by various computational tools like finite element analysis (FEA) and computational fluid dynamics (CFD), computer-aided design (CAD) and computer-aided manufacturing (CAM). In system design and controls, a mechanical engineer may apply CAD/CAM systems to feed “instructions" to computer numerically-controlled (CNC) machines such as robots, milling machines, and lathes. In this way the engineer could automate the manufacturing process without the need for intermediate drawings. A mechanical engineer working in thermo-fluid might design a heat sink, an air conditioning system, or an internal combustion engine. Other processes might focus on the fluid itself, such as a fan to cool an electrical system, a turbine to power a submarine, or a spray gun to apply chemical coatings.

Given the wide range of subjects, students preparing to study mechanical engineering should consider the programs available in their respective colleges and universities. Most mechanical engineering programs offer the major subjects of study. Fundamental subjects of mechanical engineering include: statics, dynamics, strength of materials, solid mechanics, thermodynamics, fluid dynamics, heat transfer, refrigeration and air conditioning, kinematics (including robotics), manufacturing technology, mechatronics and control theory. Mechanical engineers are also expected to understand and be able to apply concepts from chemistry and electrical engineering. At the smallest scales, mechanical engineering becomes nanotechnology and molecular engineering - one speculative goal of which is to create a molecular assembler to build molecules and materials via mechanosynthesis.

Q. What is Mining Engineering?

Mining provides the raw materials and energy resources needed to sustain modern civilization. The mining curriculum combines basic engineering subjects, topics in geology and essential courses in mining to prepare graduates to discover, evaluate and develop mineral deposits. Graduates of the program design, operate, manage and reclaim mines and mining facilities in a profitable, safe and environmentally responsible manner. A career in mining engineering requires a strong background in mathematics, computer applications, economics, communication skills and physical sciences, particularly geology, physics and chemistry. A strong global and domestic economy requires innovative well-trained engineers to meet the ever-increasing demand for energy and mineral resources.

Materials recovered by mining include bauxite, coal, diamonds, iron, precious metals, lead, limestone, nickel, phosphate, rock salt, tin, uranium, and molybdenum. Any material that cannot be grown from agricultural processes must be mined. Mining in a wider sense can also include extraction of petroleum, natural gas, and even water.

Q. What is Printing Technology?

With advent of science and technology, computers, lasers and microprocessor, printing has become no longer a craft. It is a multi-disciplinary profession dealing with nitration of text and graphic to make a final print by transferring ink or paper or board or other materials. As s printing technologist, one can find jobs in newspapers and magazines, advertising agencies, machine manufacturers and in packaging industries etc.

Q. What is Plastic & Rubber Technology?

Plastic is now a house hold goods and Plastic Technologist works for design, development and utilization of plastic in industrial as well as domestic sector. The plastic industry is an expanding one with new products and applications being developed all the time. Plastic goods are used throughout the world with every thing from household goods to the most advanced aircraft using the latest technology. The range of use is endless because plastic is so versatile. Plastic has many unique properties—it is strong and light, soft and flexible, is heat resistant and free from corrosion.

The plastic industry in India has made significant achievements ever since it made a modest but promising beginning by commencing production of polystyrene in 1957. The potential Indian market has motivated entrepreneurs to acquire technical expertise, achieve high quality standards and build capacities in various facets of the booming plastic industry.

Rubber is useful in many industries as an ingredient in the manufacturing process, including various automobile and its components. Rubber and recycled rubber have a variety of applications within the transportation, agriculture, sports & fitness, playground equipment and manufacturing industries. Specialization include products for high technology companies such as health care, military, aerospace, electronics and food processing industries including rubber-to-metal bonded parts.

The plastic and rubber sector is considered a sunrise industry and has been exhibiting a consistent export growth rate in the past. The top ten trading partners of India's plastic products include USA, UAE, Italy, UK, Belgium, Germany, Singapore, Saudi Arabia, China and Hong Kong.

Q. What is Textile Technology?

Textile engineering combines the principles of engineering with specific knowledge of textile equipment and processes. Textile engineers design, research, develop and implement automated systems for fiber production, handling and utilization. Careers paths include process engineering, R&D production control, technical sales, quality control and corporate management through the production supervisory route.

What is Leather Technology?

It deals with processing of leather obtained from various sources. After processing various products are made depending on its properties of the leather. Various types of suitcases, Jacket, Bags etc. are made from leather. Various methods to preserve it for a longer period are also taught. Job opportunities exist in the industries dealing with above-mentioned products.

Q. What is Marine Engineering?

It is the branch of engineering, which operate and maintain the propulsion and electrical generation systems onboard a ship. They also can help with the design, build, and repair of these complicated systems. New design is mostly included within the naval architecture or ship design. The merchant and military fleets of the world would not move without **Marine Engineers**. The field is closely related to mechanical engineering, although the modern engineer requires knowledge (and hands on experience) with electrical, electronic, pneumatic, hydraulic, chemistry, control engineering, naval architecture, process engineering,gas turbines and even nuclear technology on military vessels.

Marine Engineering staff also deal with the "Hotel" facilities onboard, notably the sewage, lighting, air conditioning and water systems. They deal with bulk fuel transfers, and require training in firefighting and first aid, as well as in dealing with the ship's boats and other nautical tasks- especially with cargo loading/discharging gear and safety systems. A ship's crew is divided into two distinct sections. Those who 'drive' the ship and those who maintain it. The drivers are the deck department whose manager is the Captain, and those who maintain and look after the technical side are the engineers, whose manager is the Chief engineer. Also on board are the 'ratings' who are experienced hands who, though not officers, play the central role in daily maintenance and operation of the ship.

The original term engineer on a ship meant the people who dealt with the engines ("The black hand gang"), as opposed to the Consulting Engineer concept. Marine Engineers are generally much more hands on, and often get dirty, sweaty and hot doing their jobs. Care and thought is required, however, especially with heavy machinery in a seaway, and in managing the rest of the engine-room crew.

Q. What is Metallurgical Engineering?

Metallurgical Engineering is indispensable activities in supplying materials to any industrialized nation. Curriculum is designed to provide fundamental knowledge of basic engineering and extensive coverage of the respective fields, which itself is very broad. The later portions of the program lead to applications of fundamental principles to specific designs. The metallurgical profession is extremely diverse, and it offers a wide variety of career opportunities for young people who have an interest in technology, science and engineering. Metallurgical engineers are employed in every industry and enterprise that produces, buys, sells refines or manufactures metals or metallic products. You have probably heard many times that modern societies cannot function without a plentiful supply of every conceivable type of metal and alloy and that people who are skilled in the use or production of metals and metallic materials of all kinds are highly valued.

Extractive metallurgy is the practice of separating metals from their ore, and refining them into a pure metal. In order to convert a metal oxide or sulfide to a metal, the metal oxide must be reduced either chemically or electrolytically.

In production engineering, metallurgy is concerned with the production of metallic components for use in consumer or engineering products. This involves the production of alloys, the shaping, the heat treatment and the surface treatment of the product. The task of the metallurgist is to achieve design criteria specified by the mechanical engineer, such as cost, weight, strength, toughness, hardness, corrosion resistance and performance in extremes of temperature.

Common engineering metals are aluminium, chromium, copper, iron, magnesium, nickel, titanium and zinc. These are most often used as alloys. Much effort has been placed on understanding one very important alloy system, that of purified iron, which has carbon dissolved in it, better known as steel. Normal steel is used in low cost, high strength applications where weight and corrosion are not a problem. Cast irons, including ductile iron are also part of this system.

Stainless steel is used where resistance to corrosion is important. Aluminium alloys and magnesium alloys are used for applications where strength and lightness are required.

Most engineering metals are stronger than most plastics and are tougher than most ceramics. Composites of plastics and materials such as glass fibre and carbon fibre rival metals in applications requiring high tensile strength with little weight. Concrete rivals metals in applications requiring high compressive strength and resistance to the effects of water. Wood rivals metal in applications requiring low cost and availability of materials and low cost of construction, as well as in applications requiring certain aesthetics.

This is indeed true, and metallurgical engineers command good salaries, and young metallurgical graduates can expect to be able to choose from some exciting career alternatives. Opportunities for employment exists in Research Institutions / Public Sectors Heavy Steel Plants / Laborites where search is going on for new materials to be sued in space technology, Automobile Industry, Food processing, Nuclear Industries etc.

What is Naval Architecture?

Naval architecture is an engineering discipline dealing with the design, construction, maintenance and operation of marine vessels and structures. Naval architecture involves basic and applied research, design, development, design evaluation and calculations during all stages of the life of a marine vehicle. Preliminary design of the vessel, its detailed design, construction, trials, operation and maintenance, launching and dry-docking are the main activities involved. Ship design calculations are also required for ships being modified (by means of conversion, rebuilding, modernization, or repair). Naval architecture also involves formulation of safety regulations and damage control rules and the approval and certification of ship designs to meet statutory and non-statutory requirements.

What is Ocean Engineering?

Ocean engineering is an ambiguously defined term that may refer to:

> Oceanographic engineering, also called marine electronics engineering, concerned with the design of electronic devices for use in the marine environment, such as the remote sensing systems used by oceanographers

> Offshore construction, also called offshore engineering or maritime engineering, concerned with the technical design of fixed and floating marine structures, such as oil platforms and offshore wind farms

The goal of Ocean Engineering is to develop the knowledge and technology to foster and enable the wise and effective use, development, and preservation of the ocean, its natural resources and environment.

Q. What is Robotics/Robotic Engineering?

Robotics is the branch of engineering that deals with robots and artificial intelligence. Artificial Intelligence **(AI)** is defined as intelligence exhibited by an artificial (*non-natural*, *man-made*) entity. Although "AI" has a strong science-fiction connotation, it forms a vital branch of computer science, dealing with intelligent behavior in machines.

AI divides into two schools of thought. Many definitions describe this segregation differently, but all roughly convey the same idea:

Conventional AI (symbolic AI / logical AI / neat AI): distinguished by formalism, statistical analysis, definitions and proof. Machine learning has become associated primarily with conventional AI. It includes expert systems and case based reasoning.

Computational Intelligence (**CI**) (non-symbolic AI / scruffy AI, soft computing): recognized for its informal, non-statistical and often trial-and-error approaches. Learning is usually an iterative process of connectionist system parameter tuning, based on empirical data. CI subdivides into 3 main sections: Neural networks, Fuzzy systems and Evolutionary computation. This research overlaps with a-life, cognitive science, cybernetics & robotics. Many hybrid intelligent systems have also appeared.

Q. What is Materials Science?

It is the multidisciplinary field relating the performance and function of matter in any and all applications to its micro, nano, and atomic-structure, and vice versa. It is closely related to applied physics, chemical engineering and chemistry, bioengineering and biology, mechanical engineering, civil engineering and electrical engineering; it is one of the most multidisciplinary science and engineering fields. Fundamentally, all of nanoscience and nanotechnology is materials science. Because of this, in recent years materials science has been propelled to the forefront at many universities, sometimes controversially: many academics feel that the *nano* buzzword is bringing in large amounts of funding at the cost of detracting from the teaching of fundamental materials science by putting too much emphasis on devices and applications which may or may not see fruition as working products.

Q. What is Engineering Physics (EP)?

Engineering Physics is an academic degree, usually at the level of Bachelor of Science. Unlike other engineering degrees (such as aerospace engineering or electrical engineering), EP does not necessarily include a particular branch of science or physics. Instead, EP is meant to provide a more thorough grounding in applied physics of any area chosen by the student (such as optics, nanotechnology, control theory, aerodynamics, or solid-state physics).

Q. What is Micro Technology?

Micro technology is technology with features near one micrometre (one millionth of a metre, or 10^{-6} metre, or 1µm). In the 1960s, scientists learned that by arraying large numbers of microscopic transistors on a single chip, microelectronic circuits could be built that dramatically improve performance, functionality, and reliability, all while reducing cost and decreasing volume. This development led to the Information Revolution. More recently, scientists have learned that not only electrical devices, but also mechanical devices, may be miniaturized and batch-fabricated, promising the same benefits to the mechanical world as integrated circuit technology has given to the electrical world. While electronics now provide the 'brains' for today's advanced systems and products, micromechanical devices can provide the sensors and actuators — the eyes and ears, hands and feet — which interface to the outside world. Today, micromechanical devices are the key components in a wide range of products such as automobile airbags, ink-jet printers, blood pressure monitors, and projection display systems. It seems clear that in the not-too-distant future these devices will be as pervasive as electronics.

Q. What is Nanotechnology?

Nanotechnology comprises technological developments on the nanometer scale, usually 0.1 to 100 nm (1/1,000 µm, or 1/1,000,000 mm). A possible way to interpret this size is to take the length of a hair, and imagine something ten thousand times smaller. The term has sometimes been applied to microscopic technology. Nanotechnology is any technology which exploits phenomena and structures that can only occur at the nanometer scale, which is the scale of several atoms and small molecules. The United States' National Nanotechnology Initiative website defines it as follows: "Nanotechnology is the understanding and control of matter at dimensions of roughly 1 to 100 nanometers, where unique phenomena enable novel applications." Such phenomena include quantum confinement--which can result in different electromagnetic and optical properties of a material between nanoparticles and the bulk material; the Gibbs-Thomson effect--which is the lowering of the melting point of a material when it is nanometers in size; and such structures as carbon nanotubes.

Nanoscience and nanotechnology are an extension of the field of materials science, and materials science departments at universities around the world in conjunction with physics, mechanical engineering, bioengineering, and chemical engineering departments are leading the breakthroughs in nanotechnology. The related term *nanotechnology* is used to describe the interdisciplinary fields of science devoted to the study of nanoscale phenomena employed in nanotechnology. Nanoscience is the world of atoms, molecules, macromolecules, quantum dots, and macromolecular assemblies, and is dominated by surface effects such as Van der Waals force attraction, hydrogen bonding, electronic charge, ionic bonding, covalent bonding, hydrophobicity, hydrophilicity, and quantum mechanical tunneling, to the virtual exclusion of macro-scale effects such as turbulence and inertia. For example, the vastly increased ratio of surface area to volume opens new possibilities in surface-based science, such as catalysis.

Q. What is Nuclear technology?

It is the technology that involves the reactions of atomic nuclei. It has found applications from smoke detectors to nuclear reactors and from gun sights to nuclear weapons. There is a great deal of public concern about its possible implications, and every application of nuclear technology is reviewed with care.

Major current applications:

Nuclear weapons of various designs can release tremendous destructive power. Some have been designed to level cities (up to the largest, Tsar Bomba), while other designed have looked at smaller nuclear weapons, for nuclear artillery, nuclear land mines, and nuclear bunker-busting missiles. International agreements attempt to regulate nuclear testing and limit nuclear proliferation.

Nuclear medicine is the application of nuclear technology to medicine. This includes the use of radiation to obtain images of the inside of a living body, as well as to destroy cancer. Radioactive tracers are used to probe the motion of elements on the body.

Nuclear power is the application of nuclear technology to generate power. This includes both large nuclear power plants and smaller, safer, nuclear batteries. The latter have been used on a number of spacecraft as compact, light, long-term energy sources and to power cardiac pacemakers.

Ionizing radiation is readily generated by radioactive decay. Nuclear technology is often used to construct gamma ray or neutron sources. This ionizing radiation can be useful in killing cancerous cells, or in sterilizing food and water (this process is generally known as irradiation).

A number of consumer items use nuclear technology:

Smoke detectors often contain americium; they detect smoke because it reduces the ability of alpha radiation to ionize air in the detector's ionization chamber.

Glowing watch dials and gun sights (now) often contain tritium, whose decay triggers phosphorescence in a pigment on the dial. During World War II they often contained radium instead.

Q. What is Nuclear Physics?

Nuclear physics is the branch of physics concerned with the nucleus of the atom. It has three main aspects: probing the fundamental particles (protons and neutrons) and their interactions, classifying and interpreting the properties of nuclei, and providing technological advances. Nuclei do not lend themselves to exact theoretical understanding, because they are composed of many particles (mesons as well as protons and neutrons), but are not large enough to be accurately described as periodic, as done with crystals. So "nuclear models" that, singly or in combination, account for most nuclear behavior are used. Three of the four types of physical interaction play important roles in nuclei, the strong, electromagnetic and, on a longer time scale, weak.

Nuclei are held together by strong interactions (mostly exchanging pions), but electromagnetic repulsion of the positively charged protons tends to push them apart, according to Coulomb's law. The stable nuclei all have close to the lowest energy ratio of protons to neutron for their atomic weight. Nuclei near enough to this ratio to be bound but not close enough to be stable, give off electrons or positrons (beta decay) or take in electrons (and also give off neutrinos), to move closer the that ratio. This is the main place where the weak interactions come in. Nuclei that are too massive to be stable are pulled apart by the coulomb repulsion of their protons and either fission or give off alpha particles.

Though the number of energy levels in not infinite, as it is for the electron wave functions of atoms, most stable or nearly stable nuclei have many bound levels. These usually decay toward the ground state by emitting gamma ray photons.

Protons and neutrons are fermions, with different value of the isospin quantum number, so two protons and two neutrons can share the same space wave function. In the rare case of a hypernucleus, a third baryon called a hyperon, with a different value of the strangeness quantum number can also share the wave function.

The binding energies of the protons and neutrons are on the order of 1 % of their relativistic rest masses, so non-relativistic quantum mechanics can be used with errors usually smaller than those from other approximations.

Often, nuclear physicists will use Nuclear Units where ħ, c, and the mass of the proton m_p have been set to unity.

Q. What is Optical Engineering?

It is the field of study which focuses on applications of optics.

Optical engineers design optical instruments such as microscopes, telescope and other equipment that utilises the properties of light, including optical sensors and measurement systems, as well as lasers, fiber optics communication systems, optical disc systems (e.g., CD,DVD),and many others.

Since optical engineers want to design and build devices that make light do something useful, they must understand and apply the science of optics in substantial detail, in order to know what is physically possible to achieve (physics and chemistry). But they also must know what is practical in terms of available technology, materials, costs, design methods, etc. As with other fields of engineering, computers are important to many (perhaps most) optical engineers. They are used with instruments, for simulation, in design, and for many other applications. Engineers often use general computer tools such as spreadsheets and programming languages, and they also make frequent use of specialized optical software designed specifically for their field.

Optical engineering metrology uses optical methods to measure micro-vibrations with instruments like the laser speckle interferometer or to measure the properties of the various masses with instruments measuring refraction.

Q. What is Optical Physics or **Optical Science?**

It is a subfield of atomic, molecular, and optical physics. It is the study of the generation of electromagnetic radiation, the properties of that radiation, and the interaction of that radiation with matter, especially its manipulation and control. It differs from general optics and optical engineering in that it is focused on the discovery and application of new phenomena. There is no strong distinction, however, between optical physics, applied optics, and optical engineering, since the devices of optical engineering and the applications of applied optics are necessary for basic research in optical physics, and that research leads to the development of new devices and applications. Often the same people are involved in both the basic research and the applied technology development.

Researchers in optical physics use and develop light sources that span the electromagnetic spectrum from microwaves to X-rays. The field includes the generation and detection of light, linear and nonlinear optical processes, and spectroscopy. Lasers and laser spectroscopy have transformed optical science. Major study in optical physics is also devoted to quantum optics and coherence, and to femtosecond optics. In optical physics, support is also provided in areas such as the nonlinear response of isolated atoms to intense, ultra-short electromagnetic fields, the atom-cavity interaction at high fields, and quantum properties of the electromagnetic field. Other important areas of research include the development of novel optical techniques for nano-optical measurements, diffractive optics, low-coherence interferometry, optical coherence tomography, and near-field microscopy. Research in optical physics places an emphasis on ultrafast optical science and technology. The applications of optical physics create advancements in communications, medicine, manufacturing, and even entertainment.

Q. What is Financial Engineering?

Financial Engineering has a number of possible meanings: Computational finance and Financial Reinsurance. **Computational finance** (also known as **financial engineering**) is a cross-disciplinary field which relies on mathematical finance, numerical methods and computer simulations to make trading, hedging and investment decisions, as well as facilitating the risk management of those decisions. Utilizing various methods, practitioners of Financial Engineering aim to precisely determine the financial risk that certain financial instruments create. Areas where computational finance techniques are employed include:

Investment banking

Corporate strategic planning

Securities trading and risk management

Derivatives trading and risk management

Investment management

Q. What is Manufacturing Engineering/Production Engineering?

Production Engineering is the transformation of raw materials into finished goods for sale, by means of tools and a processing medium, and including all intermediate processes involving the production or finishing of component parts ("semi-manufactures"). It is a large branch of industry and of secondary production. Some industries, like semiconductor and steel manufacturers use the term "fabrication".

Although handicraft production has been with us for many millennia, modern-style manufacturing is generally regarded as beginning around 1780 with the British Industrial Revolution, spreading thereafter to Continental Europe and North America, and subsequently around the world. Originally, the term applied to commodities or artifacts which were "made by hand".

Q. What is Telecommunication Engineering?

It is the branch of engineering that deals communication of information over a distance. The term comes from a contraction of the Greek *tele*, meaning 'far', and *communications*, meaning " the discipline that studies the principles of transmiting information and the methods by which it is delivered (as print or radio or television etc.)"

The term is most used to refer to communication using some type of signalling, such as the aldis lamp or the transmission and reception of electromagnetic energy. This covers many media and technologies including radio, fiber optics, telegraphy, television, telephone, data communication and computer networking, although other types of signalling are also included.

Q. What is Paper Engineering/Technology?

Paper technology encompasses the design and analysis of the equipment and processes that are used in the manufacture of paper. The field encompasses the preparation of fibrous materials from (usually) trees via a pulping process, chemical and mechanical pretreatment of the fibers in a fluid suspension, the forming and dewatering of a web on a paper machine, and the post-treatment of the sheet with coating, calendering, and other mechanical processes.

Paper making is not chemical engineering. On the contrary, the paper industry is a client of the chemical industry.

Q. What is Nuclear Engineering?

It is the practical application of the atomic nucleus gleaned from principles of nuclear physics and the interaction between radiation and matter. This field of engineering includes the design, analysis, development, testing, operation and maintenance of nuclear fission systems and components, specifically, nuclear reactors, nuclear power plants and/or nuclear weapons. The field can also include the study of nuclear fusion, medical applications of radiation, nuclear safety, heat transport, nuclear fuels technology, nuclear proliferation, and the effect of radioactive waste or radioactivity in the environment.

Q. What is Petroleum Engineering?

Petroleum Engineering is involved in the exploration and production activities of petroleum as an upstream end of the energy sector. Upstream, refers to the source of the petroleum, the petroleum deposit, usually buried deep beneath the earth's surface supplying flow to consumers as a river supplies the ocean. The diverse topics covered by petroleum engineering are closely related to the earth sciences. Petroleum engineering topics include geology, geochemistry, geomechanics,geophysics, oil drilling, geopolitics, knowledge management, seismology, team building, team work, tectonics, thermodynamics, well logging, well completion, oil and gas production, reservoir development, and pipelining.

It is an increasingly technical profession that involves procuring reserves from places that predecessors deemed too difficult or not economic with the technology of the day or commodity prices. While not thought of as highly technical in some circles, this is a fallacy. The use of high technology equipment, high speed computers, innovative materials, team management philosophies, statistics, probability analysis, and knowledge management, is usually coupled with the reality of only indirect measurement of most essential facts due to being buried under miles of earth. One look at the number of patents held for use in the industry is testimony to the highly technical nature of this field.

One key aspect of this profession is excellence. Where mistakes are measured in millions of dollars petroleum engineers will be held to a higher standard. Deepwater operations can be compared to space travel in terms of technical challenges. Arctic conditions and conditions of extreme heat have to be contended with. High Temperature and High Pressure (HTHP) environments that have become increasingly commonplace in today's operations require the petroleum engineer to be savvy in topics as wide ranging as thermohydraulics, geomechanics, and intelligent systems.

Petroleum engineers must implement high technology plans with the use of manpower, highly coordinated and often in dangerous conditions. The drilling rig crew and machines they use become the remote partner of the petroleum engineer in implementing every drilling program. Understanding and accounting for the issues and communication challenges of building these teams remain just as vital to the petroleum engineer as ever.

The Society of Petroleum Engineers is the largest professional society for petroleum engineers and is a good source of information. Petroleum engineering education is available at dozens of universities in the United States and throughout the world - primarily in oil producing states - but not only top producers.

Petroleum engineers have historically been one of the highest paid engineering disciplines; this is offset by a tendency for mass layoffs when oil prices decline. Petroleum engineering offers a challenging blend of earth sciences, geology, operations, politics, advanced mathematics and the opportunity to risk massive amounts of money. The rewards for successful engineers range from high paying jobs to the opportunities to start oil companies.

Q. What is Software Engineering?

It is the profession of people who create and maintain software applications by applying technologies and practices from computer science, project management, engineering, application domains and other fields.

Software engineering deals with issues of cost and reliability, like traditional engineering disciplines. Some software applications contain millions of lines of code that are expected to perform properly in the face of changing conditions, making them comparable in complexity to the most complex modern machines. For example, a modern airliner has several million physical parts (and the space shuttle about ten million parts), while the software for such an airliner can run to 4 million lines of code.

Q. What is Safety Engineering?

Safety engineering is an applied science strongly related to systems engineering. Safety engineering assures that a life-critical system behaves as needed even when pieces fail.

Safety engineers distinguish different extents of defective operation: A "fault" is said to occur when some piece of equipment does not operate as designed. A "failure" only occurs if a human being (other than a repair person) has to cope with the situation. A "critical" failure endangers one or a few people. A "catastrophic" failure endangers, harms or kills a significant number of people.

Safety engineers also identify different modes of safe operation: A "probabilistically safe" system has no single point of failure, and enough redundant sensors, computers and effectors so that it is very unlikely to cause harm (usually "very unlikely" means, on average, less than one human life lost in a billion hours of operation). An inherently safe system is a clever mechanical arrangement that cannot be made to cause harm – obviously the best arrangement, but this is not always possible. A fail-safe system is one that cannot cause harm when it fails. A "fault-tolerant" system can continue to operate with faults, though its operation may be degraded in some fashion.

These terms combine to describe the safety needed by systems: For example, most biomedical equipment is only "critical", and often another identical piece of equipment is nearby, so it can be merely "probabilistically fail-safe". Train signals can cause "catastrophic" accidents (imagine chemical releases from tank-cars) and are usually "inherently safe". Aircraft "failures" are "catastrophic" (at least for their passengers and crew) so aircraft are usually "probabilistically fault-tolerant". Without any safety features, nuclear reactors might have "catastrophic failures", so real nuclear reactors are required to be at least "probabilistically fail-safe", and some such as pebble bed reactors are "inherently fault-tolerant".

Q. What is Space Technology/Engineering?

Space technology/engineering is a term that is often treated as a different category of engineering. Outer space (as commonly used, the universe exclusive of Earth, see also extraterrestrial) is such an alien environment that attempting to work with it leads inevitably to new leading edge techniques and knowledge. New technologies originating with or accelerated by space-related endeavors are often subsequently exploited in other economic activities. This has been widely pointed to as beneficial spin-off by space advocates and enthusiasts favoring the investment of public funds in space activities and programs. Political opponents counter that it would be far cheaper to develop specific technologies directly if they are beneficial and scoff at this justification for public expenditures on space-related research.

For example: Computers and telemetry were once leading edge technologies that might have been considered "space technology" because of their criticality to boosters and spacecraft. They existed prior to the Space Race of the Cold War but their development was vastly accelerated to meet the needs of the two major superpowers' space programs. While still used today in spacecraft and missiles, the more prosaic applications such as remote monitoring (via telemetry) of patients, water plants, highway conditions, etc. and the widespread use of computers far surpasses their space applications in quantity and variety of application.

Q. How can I take admission into an Engineering College?

Different Boards (central or state) conducts (10+2) or Higher Secondary Examination in science stream throughout the country, which is the minimum educational eligibility criterion for admission into an engineering college. In order to keep parity of admission and give every student equal opportunity irrespective of the board from where he/she has passed the qualifying examination, most of the reputed engineering colleges conduct admission test for admitting students into the first year of the engineering course. These admission tests are conducted at National Level as well as State Level. The most important engineering entrance test at national level is the IIT-JEE and All India Engineering Entrance Examination (AIEEE). Admission into all the Indian Institute of Technology is through IIT-JEE and all the National Institute of Technology (NIT) is through AIEEE only. Given below is a list of some important engineering admission tests and tentative time of notification (visit web site for detail):

01.	IITs/ISM/BHU(IIT-JEE)	Sept/Oct
02.	Birla Institute of Technology, Mesra	Jan/Feb
03.	National Institute of Foundry & Forge Technology	January
04.	College of Architecture, Chandigarh	January
05.	Department of Chemical Engg & Tech(Panjab University)	January
06.	Punjab Engineering College(All India Seats)	January
07.	University of Delhi(all India Seats)	Fan/Feb
08.	Jamia Millia Islamia, New Delhi	May
09.	School of Planning & Architecture, New Delhi	April/May
10.	GGS IP University, Kashmere Gate, Delhi-110006	Feb/March
11.	Karnataka Common Entrance Test, CET Cell, SJM Samudaya Bhavan, 1, Main Road, Gandhi Nagar, Bangalore-560009	Feb/March
12.	National Institute of Design, Ahmedabad-380007(GDPD courses)	Oct/Nov
13.	National Diary Research Institute, Karnal	April
14.	National Fire Service College, Nagpur	March
15.	Sir J.J. College of Architecture, Dr. D.N.Road, Mumbai-400001	April
16.	Pondicherry University(All India Seats)	April/May
17.	Thapar Institute of Technology(All India Seats)	Jan/Feb
18.	BITS, Pilani	April
19.	Indian Institute of Information Technology, Hyderabad	Jan/Feb
20.	Indian Institute of Information technology, Allahabad	Jan/Feb
21.	Anna University, Chennai(All India Seats)	Jan/Feb
22.	AMU, Aligarh	Jan/Feb
23.	Dayalbagh Educational Institute, Agra	April/May
24.	GB Pant University(All India Seats)	April/May
25.	HBTI, Kanpur(All India Seats)	December
26.	University of Roorkee	November
27.	Rohilkhand University	January
28.	All India Engineering Entrance Examination(AIEEE)	Nov/Dec

Q. What is IIT-JEE?

The Indian Institutes of Technology are Institutions of national importance established through an act of Parliament. These Institutes play a leading role in technological manpower development and research programmes comparable with the best in the world. Admissions to Undergraduate Programmes for all Indian and Foreign nationals at these institutions are made through the Joint Entrance Examination (JEE).

Institute of Technology- Banaras Hindu University, Varanasi is one of the oldest institutions devoted to education in various engineering disciplines. Indian School of Mines, Dhanbad, a deemed university, is the oldest institution of its kind in India. The admissions to the Undergraduate Programmes at these institutions are also made through JEE.

These institutions are known for providing quality technological and scientific education and for research in frontier areas. The environment at all these Institutions is highly conducive for

Building of solid foundation of knowledge,

Development of personality,

Confidence building,

Pursuit of excellence and self-discipline,

Enhancement of creativity through motivation and drive, which helps to produce professionals well trained for the rigours of professional and social life.

Today, alumni of these institutions occupy key positions in industry/academia in India and abroad.

Each Institute has well-equipped modern laboratories, a state-of-the-art library and computer networks. The selected candidates live in a pleasant and intellectually stimulating environment. The teaching methods rely on direct personal contact between the teacher and the students. Living in such an environment with people having similar goals and aspirations is an exciting experience during one's academic life.

Credit-based academic programmes offer flexibility allowing students to progress at his own pace. A minimum level of performance is necessary for satisfactory progress. The medium of instruction is English. These institutes offer courses leading to Bachelor's degree in a number of engineering, technology and science disciplines.

M.Sc. integrated courses in pure and applied sciences and M.Tech. (Integrated) courses in a few disciplines are also offered by some of these Institutes. In addition, some IITs offer dual-degree M.Tech. programmes, wherein both B.Tech. and M.Tech. degrees are awarded at the end of the programme.

The current pattern, which has been followed since 2006, consists of two objective type papers each containing maths, physics and chemistry sections. The syllabus of the examination is predominantly based on topics covered by the CBSE Board Examination (AISSCE) and the ISC Board Examination. The pattern of questions in JEE is deliberately variable so as to minimize the chance of students getting selected by cramming up the probable questions. As it is objective type questions, Optical mark recognition answer sheets has been adopted since 2006. In previous years, there were separate maths, physics and chemistry papers, each of two hours' duration that contained both subjective and objective Questions. The current pattern is adopted so as to reduce the students' stress. .

Given the importance attached to the JEE by students all over India, the IITs follow a rigorous procedure when conducting it every year. The exam is set by the JEE Committee (consisting of a group of faculty members drawn from the admitting colleges) under the tightest security. Multiple sets of question papers are framed and the set that is to actually be used on the day of the exam is known to only about five individuals. The JEE has been noted for originality in its questions.

The age limit for appearing in IIT-JEE is 25 years. For candidates belonging to SC, ST and PD categories, the relaxed age limit is 30 years. Also, starting 2007, a candidate can take the JEE two times at the most. This has been done mainly to reduce stress on students and discourage the concept of "cram schools". Furthermore, from 2007 on, students who are selected for admission to an IIT cannot attempt the examination again in the future. From 2008 six new IITs have been opened with 120 seats each increasing the total number of seats to almost 7000. For 2009, admissions have been made to two more IITs, namely IIT Indore and IIT Mandi (Himachal Pradesh) taking the seat count to almost 8300. As of 2011, with additional courses in several old and new IITs, the total seat count has crossed 9600.

Candidates applying for JEE should have either completed or appearing in any one of the following qualifying examinations:

- The final examination of the 10+2 system, conducted by any recognized Central/State Board, such as Central Board of Secondary Education, New Delhi; Council for Indian School Certificate Examination, New Delhi; etc.;
- Intermediate or two-year Pre-University Examination conducted by a recognized Board/ University.
- Final Examination of the two-year course of the Joint Services Wing of the National Defence Academy.
- General Certificate Education (GCE) Examination (London/Cambridge/Sri Lanka) at the Advanced (A) level.
- High School Certificate Examination of the Cambridge University.
- Any Public School/Board/University Examination in India or in any foreign country recognized by the Association of Indian Universities as equivalent to 10+2 system.
- H.S.C. Vocational Examination.
- Senior Secondary School Examination conducted by the National Open School with a minimum of five subjects.
- 3 or 4-year Diploma recognized by AICTE or a State Board of Technical Education.

In case the relevant qualifying examination is not a public examination, the candidate must have passed at least one public (Board or Pre-University) examination at an earlier level. The candidates belonging to the general category must secure a minimum of 60% marks in aggregate in their Qualifying Examination. Candidates belonging to SC, ST and PD categories must secure a minimum of 55% in aggregate in the Qualifying Examination. If any Board awards only letter grades without providing an equivalent percentage of marks on the grade sheet, the candidate should obtain a certificate from the

Board specifying equivalent marks, and submit it at the time of counselling. In case, such a certificate is not provided by the candidate, the decision of the Joint Implementation Committee regarding his/her eligibility shall be held final.

Physical Fitness: All qualified candidates will have to submit a Physical Fitness certificate from a Registered Medical Practitioner in the prescribed format that will be made available to them at an appropriate time. They will be admitted only if they are physically fit for pursuing a course of study at the participating Institutes.

WEBSITES AND IVRS FOR JEE			
Institute	**Websites**	**STD code**	**Number**
IIT Bombay	http://www.iitb.ac.in/jee	022	25767062
IIT Delhi	http://www.iitd.ac.in/jee	011	26581064, 26582002
IIT Guwahati	http://www.iitg.ac.in/jee	0361	2692788
IIT Kanpur	http://www.iitk.ac.in/jee	0512	2597236
IIT Kharagpur	http://www.iitkgp.ernet.in/jee	03222	281881, 278241
IIT Madras	http://jee.iitm.ac.in/	044	22578223
IIT Roorkee	http://www.iitr.ac.in/jee	01332	279805, 279806

Q. What is All India Engineering Entrance Examination (AIEEE)?

The **All India Engineering Entrance Examination** (**AIEEE**), is an examination organized by the Central Board of Secondary Education (CBSE) in India. Introduced in the year 2002, this national level competitive test is for admission to various under-graduate engineering and architecture courses in institutes accepting the AIEEE score, including 5 Indian Institute of Information Technology (IIITs) and 30 National Institutes of Technology (NITs). The examination is generally held on the last Sunday of April and results are announced in the last week of May or the first week of June. Candidates are ranked on an all-India basis and state basis. Thus, they have an All India Rank (AIR) and a State Rank (SR).

The examination consists of two papers: Paper 1 and Paper 2. Paper 1 has three sections: Mathematics, Physics and Chemistry with equal weight for each subject. Each section consists of multiple choice objective-type questions each of which has four choices. Out of the four choices for a given question, only one choice is correct. Paper 1 has a negative-marking scheme wherein an incorrect answer is negatively marked with one fourth of the maximum marks allotted to the question. Paper 2 has three sections: Mathematics, Drawing, and Aptitude. Mathematics, and Drawing sections have multiple choice objective-type questions and the Aptitude section has drawing-based questions. The duration of each paper is three hours. Candidates are not allowed to carry any textual material, calculators, logarithmic tables or electronic devices into the examination hall. The number of questions and their maximum marks have been variable through the years. The questions are based on a syllabus that is common to syllabi of all the state boards in India and the Central Board of Secondary Education. Candidates can opt for question papers either in English or in Hindi language. For admission to B.Tech or B.E. courses in the participating institutes the candidate is required to take the Paper 1; for admission to B.Arch or B. Planning courses the candidate is required to take Paper 2. Students can opt to take any one or both the papers. The examination was conducted in offline pen and paper mode till 2010. In 2011, as per the orders of the Ministry of Human Resource Development, CBSE conducted the Paper 1 in the Computer-Based-Test mode for the first one lakh candidates who opted for the same, while the remaining students took the examination in the conventional pen and paper mode. The number of attempts which a candidate can avail at the examination is limited to three in consecutive years.

Q. What is IISc? (Indian Institute of Science, Bangalore)

Jamsetji Nusserwanji Tata (1839-1904) was one of the extraordinary men who even towards the end of the nineteenth century was convinced that the future progress of the country depended crucially on research in Science and Engineering. He envisaged this Institute as destined to promote original investigations in all branches of learning and to utilise them for the benefit of India.

After consulting several authorities in the country, he constituted a Provisional Committee to prepare the required scheme for the setting up of the Institute. On 31st December 1898, a draft prepared by the Committee was presented to Lord Curzon, the Viceroy-designate. Subsequently, upon the request of the Secretary of State for India, the Royal Society of London asked for the help of Sir William Ramsay, Nobel Laureate.

Ramsay made a quick tour of the country and reported Bangalore to be the suitable place for such an Institution.

With the establishment of the University Grants Commission in 1956, the Institute came under its purview as a deemed university.

The Institute has been able to make many significant contributions primarily because of a certain uniqueness in its character. It is neither a National Laboratory which concentrates solely on research and applied work, nor a conventional University which concerns itself mainly with teaching. But the Institute is concerned with research in frontier areas and education in current technologically important areas. This is also the first Institute in the country to introduce innovative Integrated Ph D Programmes in Biological, Chemical and Physical Sciences for science graduates.

During the past eight decades many are the alumni and faculty who have gone out from this Institute to direct science and technology in the country, to create and nurture other laboratories and scientific institutions and to establish key industries. C V Raman, H J Bhabha, Vikram S Sarabhai, J C Ghosh, M S Thacker, S Bhagavantam, S Dhawan, C N R Rao and scores of others who have played a key role in the scientific and technological progress of our country have been closely associated with the Institute.

The Institute has pioneered advanced education in India, and has been making many significant contributions to frontier areas of research. The number of students in the institute is kept deliberately small in order to focus on quality. It has been able to innovate and introduce (a) new systems of imparting knowledge; and (b) educational reforms such as offering courses under unit system.

The Institute was the first to introduce (i) Masters' programs in engineering; (ii) more recently, the Integrated Ph.D Programs in Biological, Chemical, Physical and Mathematical Sciences for science graduates; (iii) the new IISc Young Fellowship program for the first 20 rank holders at the + 2 level; and (iv) IISc Young Engineering Fellowship program for merited III year BE/ B Tech students.

The Institute has been primarily responsible for starting many fields of activity. It is now involved in several areas of national importance: space science and technology, nanoscience and engineering, environmental and atmospheric sciences, endocrinology, genetic engineering, rural technology and energy problems.

The Institute has a Centre for Scientific and Industrial Consultancy, through which significant R&D work is done on identified projects sponsored by industries. The know-how so generated has been transferred to industries. Transfer of technology has also taken place in areas such as low-cost housing and renewable sources of energy which benefit the society. Similarly, the facilities available at the Institute such as low and high speed wind tunnels, water tunnel, high speed computers and sophisticated instruments have been helping public and private sector industries and defence. There has also been a certain amount of social utilization of work in biosciences, for instance, (i) in plant tissue culture of sandal wood, eucalyptus and teak wood, (ii) disease control in silk worms, and (iii) on nutritional value enhancement of rice strains. Some recent projects include the development of cryogenic equipment and vessels for advanced aircraft, fracture analysis of industrial and space launch vehicle components, thermo-metallurgical modeling of steel industries, acoustic absorbers to reduce acoustic pollution in industrial environment and automobiles, and microbial techniques for gold extraction from mines. In 1997, the Institute released technologies relating to AIDS diagnostic kit, biomass gasifier and ferroelectric materials. It has also launched a major new initiative, called Sustainable Transformation of Rural Area (SuTRA).

In all these endeavors, the Institute, with a keen awareness of its noble tradition and the need for maintaining a high quality in all its activities, strives to contribute to the scientific, academic and technological goals of our country.

Whatever may be your natural skill and interests — mathematics, frontier research areas in the theoretical sciences, experimental work in biology, physics and chemistry, new areas in engineering and technology — you will find, in the Institute, a congenial environment to develop your abilities that will stimulate you to make significant new and original contributions in an area of your choice.

Research Programs

Science Faculty (Ph D only):

Astronomy & Astrophysics

Biochemistry

Ecological Sciences

High Energy Physics

Inorganic & Physical Chemistry

Materials Research

Mathematics

Microbiology & Cell Biology

Molecular Biophysics

Molecular Reproduction Development and Genetics

Organic Chemistry

Physics

Solid State & Structural Chemistry

Engineering Faculty (M Sc [Engg] & Ph D):

Aerospace Engineering

Atmospheric & Oceanic Sciences

Chemical Engineering

Civil Engineering

Computer Science & Automation

Electrical Engineering

Electronics Design & Technology

Electrical Communication Engineering

High Voltage Engineering

Instrumentation

Management Studies

Materials Research

Mechanical Engineering

Metallurgy

Supercomputer Education & Research

Use Programs

ME in following branches

Aerospace, Chemical, Civil, Computer Science & Engineering, Electrical, High Voltage, Internet Science & Engineering, Mechanical, Metallurgy, Microelectronics, Signal Processing, Systems Science & Automation and Telecommunication.

M TECH

Instrumentation, Electronics Design and Technology, and Computational Science.

M DES

Product Design & Engineering

Integrated Ph D Programs (after B.Sc. in 10+2+3 system)

(i) Biological, (ii) Chemical, (iii) Physical and (iv) Mathematical Sciences.

Q. What is National Institute of Design (NID)?

The National Institute of Design (NID) is internationally acclaimed as one of the foremost multidisciplinary institutions in the field of design education, applied research, training, design consultancy services and outreach programmes. It has been the recipient of significant national and international awards since it was established in 1961 as an autonomous institution under the Ministry of Industry, now known as Ministry of Commerce & Industry, Government of India. NID has been a pioneer in industrial design education after Bauhaus and Ulm in Germany and is known for its pursuit of design excellence to make Designed in India , Made for the World a reality. NID's graduates have made a mark in key sectors of commerce, industry and social development by taking role of catalysts and through thought leadership. NID has been recognised as a Science and Industrial Research Organisation by the Department of Science & Technology, Government of India.

Graduate Diploma Programme in Design (GDPD) commences with a two-semester Foundation Programme. This programme is geared to assist in developing attitudes and sensorial skills, necessary for further specialisation in specific areas of design. The purpose is to create an awareness of the environment and to arouse the students' creative faculties. The primary concern of the Foundation Programme is to introduce the students to the Fundamentals of design, to inculcate them to design as a problem solving process and to develop a highly evolved aesthetic sensitivity, and 'design' attitude.

In the foundation programme, basic design courses are augmented by related studies of science and liberal arts, to help and develop an understanding of the Indian milieu and the relevance of design.

The foundation programme is geared to inculcate the development of values, attitudes and sensorial skills; necessary for any design specialisation. It aspires to create an awareness of the changing environment by constantly relating the students¡¯ learning to real life situations. The programme provides the necessary direction, stimuli, facilities and experience to foster creativity and thereby help each individual discover their own identity, ability and potential.

The foundation programme is the basis on which the remaining design curriculum is built. It also makes students appreciate the multidisciplinary nature of design.

This 4-year intensive professional UG programme is offered in the following three Faculty streams (possible areas of design specialisation through projects are given in brackets):

Industrial Design

(Product Design, Furniture and Interior Design, Ceramic & Glass Design)

Communication Design

(Graphic Design, Animation Film Design, Film & Video Communication, Exhibition Design)

Textile and Apparel Design

(Textile Design)

Admission is open to students who have passed or who will appear for qualifying examinations under the Higher Secondary (10+2), or equivalents like AISSCE/IB/ICSE etc. It is understood that individual students, who have passed the Institute's admission tests / interviews, will be admitted provisionally to the education programme subject to passing their qualifying examinations before they join the Institute.

Competence in technical and related subjects will normally be considered an advantage. The medium of instruction at NID is English. Upper age limit for candidates is 20 years (relaxable by 3 years for SC/ST candidates) as on 1 June of the year of admission.

Admission announcements are issued in the leading national dailies in the last week of September every year. Application forms along with the prospectus for admission is available on request from the second week of October on payment of requisite fees by Demand Draft of any scheduled bank drawn in favour of the National Institute of Design payable at Ahmedabad. Forms are also available at selected branches of Bank of India across the country. Forms downloaded from NID's website <www.nid.edu>. along with required amount of DD drawn in favour of National Institute of Design payable at Ahmedabad is also accepted.

Admission is on the basis of NID's method of selection which extends beyond the students previous academic qualifications. The NID Admission Committee systematically seeks evidence of the perception, attitudes, aptitudes, and achievement motivation essential for a challenging and satisfying design career. The objectives of the tests and the interviews is to ascertain these. The tests at the various centres is consist of design aptitude tests. Based on scores obtained from these tests, short listed candidates are called for second phase of admission procedure.

The second phase of the admission procedure include studio tests followed by interviews at Ahmedabad. All those called for the second phase are required to attend the studio tests and interview, which completes the process of selection. The procedures, grades and weightage for each year will be decided by the Admission Committee for the year.

The norms for the selection are the sole prerogative of the Admission Committee and the decision of the Admission Committee and the Management in any of the matters concerning the admission process and selection will be final. Any direct or indirect attempt to influence the admission committee/or its members, academic office bearers or management will lead to automatic disqualification of the candidate.

The Graduate Diploma Programme students are admitted only into the Foundation Programme and their entry into different design domains is not automatic. On successful completion of the Foundation Programme, the final decision on the specific design domain will be recommended by the Semester Jury. All students are required to be present for the Orientation Programme and no exceptions can be made. Failure to be present at the Orientation programme may mean an automatic withdrawal by NID of its admission offer. Students who leave the Institute after joining will forfeit the entire tuition fees and other charges and will get only the refundable deposit.
As per the Government of India requirement fifteen percentage and seven and a half percentage seats are reserved for Scheduled Caste and Scheduled Tribe candidates. 3% seats are reserved for persons with disabilities as per the Persons with Disability Act,

1995. The qualifying candidates need to meet the eligibility and admission requirements of NID.

Number of Seats

Intake into the Graduate Diploma Programme is 60 and for the Post-Graduate Diploma Programme is 165. Number of seats available for PGDPD in different disciplines are as under:

Product Design	15
Furniture & Interior Design	10
Ceramic & Glass Design	10
Toy Design & Development	10
Apparel Design & Merchandising	15
Lifestyle Accessory Design	10
Textile Design	15
Animation Film Design	10
Film & Video Communication	10
Graphic Design	10
New Media Design	10
Software & User Interface Design	10
Information & Digital Design	10
Strategic Design Management	20

Important Dates

Issuing of Forms starts from October

Last date for issuing of form by post from NID November

Last date for obtaining forms from BOI November

Last date for receiving completed forms at NID December

Test for PGDPD January

Test for GDPD January

Q.How can I take admission in BITS Pilani?

The Birla Institute of Technology & Science (BITS), Pilani is an all-India Institute for higher education. The primary motive of BITS is to "train young men and women able and eager to create and put into action such ideas, methods, techniques and information". The Institute is a dream come true of its founder late Mr G.D.Birla - an eminent industrialist, a participant in Indian freedom struggle and a close associate of the Father of Indian Nation late Mr. Mohandas Karamchand Gandhi (Mahatma Gandhi). What started in early 1900s as a small school, blossomed into a set of colleges for higher education, ranging from the Humanities to Engineering until 1964 when all these colleges amalgamated to culminate into a unique Indian University of International standing. This university was christened as the Birla Institute of Technology and Science, Pilani, known to many as BITS, Pilani.

Over the years, BITS has provided the highest quality technical education to students from all over India admitted on the basis of merit. Its graduates may be found throughout the world in all areas of engineering, science and commerce. BITS symbolizes the maturing of Indian technical ability and "can-do" entrepreneurial spirit, especially as derived from the private sector. BITS is located in the Vidya Vihar campus adjacent to the town of Pilani in Rajasthan.

First Degree Programs

These degrees are offered at the first tier have nomenclature like B.E. (Hons.), B.Pharm. (Hons.), M.M.S (Master of Management Studies), M.Sc. (Hons.), M.Sc. (Tech.), and M.A. (Hons.). These are level wise equivalent degrees. These are called integrated degrees for two reasons: (i) there are several common courses like basic math and science amongst these degrees, and (ii) no intermediate degree, like, B.Sc., B.Sc. (Hons.), B.A., B.A. (Hons), etc. is awarded. These degrees are based on a modular structure and their academic requirements are spelt out in respect of the number of courses rather than the number of years. All these programmes are structured in a way, such that, a student will be able to finish a programme in eight semesters. The flexibility of the Institute allows a student to do her/his programme at a faster pace and finish it earlier than 8 semesters or at a slower pace to finish it later than 8 semesters.

For admission to any of the above Integrated First Degree programmes Candidates should have passed the 12th examination of 10+2 system from a recognized Central or State board or its equivalent with Physics, Chemistry, and Mathematics. Further the candidate should have obtained a minimum of aggregate 80% marks in Physics, Chemistry and

Mathematics subjects in 12th examination, with at least 60% marks in each of the Physics, Chemistry, and Mathematics subjects and should have adequate proficiency in English.

In order to apply for admission to the Integrated First Degree programmes, the candidates have to appear in the **online computer based test (BITSAT)** as per the announcement made by the Institute through advertisement and brochures. Admissions are made purely on merit. The merit position of the candidate for admission will be based on the score obtained by the candidate in the BITSAT. However, their eligibility for admission is subject to fulfilling the requirement of minimum marks in 12th examination, as mentioned above.The Institute considers only the latest performance through a public examination for admission. If the results of the latest examination are not available within the due date for submission of application, the candidate will not be considered even if there are some earlier performances of 12th class or its equivalent or any higher examination available with him/her. If a candidate has taken more than one attempt in 12th class or its equivalent, only his latest performance is considered, provided this attempt has been for the full component of subjects/courses prescribed. The Institute always ensured guaranteed admission to all the students who obtained first ranks in their respective board examinations. The Institute will give direct admission to first rank students of all the central and state boards to the programme of their choice, irrespective of their **BITSAT** score.

Eligibility criteria for admission under 'Direct admission to Board toppers' scheme:

To be eligible for admission under the 'Direct admission to Board toppers' scheme, the candidate should be the topper from the science stream having taken Physics, Chemistry, Mathematics subjects in 12th. To identify the topper, the following criteria will be adopted.

a) has taken Physics, Chemistry, and Mathematics subjects in 12th and

b) has obtained the highest aggregate percentage of marks in 12th among all the students who have taken Physics, Chemistry, and Mathematics subjects from the Board. For the purpose of calculating the aggregate percentage, the aggregate marks should include the marks of Physics, Chemistry, and Mathematics subjects in addition to other subjects which are required to pass the 12th examination from the Board under consideration. Further, the Physics, Chemistry, Mathematics subject marks should be included in the aggregate, irrespective of whether the Physics, Chemistry, and Mathematics subjects are identified as main/optional/elective in his marksheet(s).

Applicants under the scheme should attach documentary proof in support of their claim, along with the 12th mark sheet and a letter from the Board declaring the candidate as the topper in the specified stream. The Institute will also make efforts to get these data from the different boards on its own. In all cases, the Institute will be guided by the data provided by the concerned Board. In cases where for a particular board, the data available before the deadline is insufficient or inconclusive, the admission committee may decide not to make any offer under the scheme for that specified Board. In all such cases, the decision of the Vice chancellor will be final and binding on the applicants

Q. How can I take admission in Delhi College of Engineering?

The admission to B.E. COURSES in both the reputed engineering institutions in Delhi, namely, Delhi College of Engineering (DCE) and Netaji Subhas Institute of Technology (NSIT), is done centrally by Delhi College of Engineering on the basis of the Combined Entrance Examination, CEE held in May.

ELIGIBILITY CONDITIONS FOR ADMISSION

A candidate passing any one of the following examinations (termed hereafter as the Qualifying Examination) and securing 60% or more marks in the aggregate of Physics, Chemistry and Mathematics shall be eligible for admission to the First Semester of Bachelor of Engineering Programme provided he/she has passed in each subject separately:

i) Senior School Certificate Examination (12 Years Course) of the Central Board of Secondary Education (C.B.S.E.) New Delhi. 49
ii) Indian School Certificate Examination (12-years Course) of the Council for Indian

School Certificate Examination , New Delhi.
iii) B.Sc. (Gen.) Group A' Final Examination of the University of Delhi or an equivalent examination.

iv) B.Sc. (Hons.) Examination in Physics, Chemistry and Mathematics of the University of Delhi with the combination Physics, Chemistry, Mathematics and with equal weightage to the subsidiary subjects, or an equivalent examination.

v) Any other examination recognised as equivalent to the Senior School Certificate Examination of the C.B.S.E. by the University of Delhi.

A candidate must additionally have passed English as a subject of study either at the 10th Class level or 12th Class level (core or elective).

Note:

i) An applicant who has to leave an Engineering Degree Course, or an equivalent Course, after exhausting the permissible number of chances in any other University/Board in India, will not be eligible for admission to Bachelor of Engineering Course.

ii) Candidates who have appeared at the Annual Examination in the year and placed in compartment will not be eligible for admission for the year.

iii) Candidates who have appeared at the Annual Examination of the year and are to reappear for the improvement to acquire the eligibility will not be considered for admission for the year.

iv) No admission will be made directly to the second or any subsequent semester of the Course.

v) No change of branch will be permitted after the commencement of the second semester, even if some seats fall vacant in some of the branches during the Course of second-semester.

vi) No admission will be made after 31st August. The University of Delhi may, however, condone the delay in exceptional cases.

Relaxation in Marks for Reserved Category: Candidates belonging to the following categories, who apply for seats reserved for them shall be allowed a concession in the minimum eligibility requirements as detailed below:

i)Scheduled Castes/Scheduled Tribes Candidates belonging to Scheduled Castes/Scheduled Tribes shall be allowed 10% concession of marks in the minimum eligibility/requirements.

ii) Defence Quota: The children and/or widows of Personnel of Armed/Para-Military forces killed/disabled in action during hostilities who apply for seats reserved for them shall be allowed relaxation of 5% marks in the minimum eligibility requirements. iii)Physically Handicapped (PH): The candidate belonging to Physically Handicapped category shall be allowed 5% concession of marks in the minimum eligibility requirements. Applicant must be 17 years of age on or before the 1st October of the year in which he/she seeks admission. Relaxation in age upto one year only, with the approval of the Vice-Chancellor, is permissible (Such candidates should apply for relaxation only at the time of admission).

Q. How can I take admission in engineering courses of Guru Gobind Singh Indraprastha University, Delhi?

Guru Gobind Singh Indraprastha University, established by the Government of NCT of Delhi under the provisions of Guru Gobind Singh Indraprastha University Act, 1998 is an affiliating and teaching University that aims to facilitate and promote studies, research and extension work in emerging areas of higher education with focus on professional education in the disciplines of engineering, technology, management studies, medicine, pharmacy, nursing, education, law, etc .

Various full time/weekend professional programmes offered in the University Schools of Studies, University maintained Indira Gandhi Institute of Technology, Government Institutions, Centres of Learning & Education and Self-financing Institutions affiliated to the University.

COMMON ENTRANCE TEST (CET) HELD for admission into

Bachelor of Architecture (B.Arch.)

B.Tech./M.Tech. (Dual Degree)

Bio-Technology

The eligibility criteria and all other details for Admission/ CET are available in the Admission Bulletin.

With a view to make the hassle free environment during the admission and thereby providing the requisite convenience to the applicants as well as their parent/guardians, the University is also providing On-Line Registration/Submission of Application Form. For detail visit www.ggsipu.nic.in.

Q. Which are the best engineering colleges in India?

Top 100 engineering colleges of India

Rank	**College Name**	**Govt./Private**
1	Indian Institute of Technology IIT Kanpur, Kanpur	Government
2	Indian Institute of Technology IIT Kharagpur, Kharagpur	Government
3	Indian Institute of Technology IIT Bombay, Mumbai	Government
4	Indian Institute of Technology IIT Madras, Chennai	Government
5	Indian Institute of Technology IIT Delhi, Delhi	Government
6	BITS Pilani, Pilani	Private
7	IIT Roorkee, Roorkee	Government
8	IT-BHU, Varanasi	Government
9	IIT-Guwahati, Guwahati	Government
10	College of Engg , Anna University, Guindy	Government
11	Jadavpur University , Faculty of Engg & Tech, Calcutta	Government
12	Indian School of Mines, Dhanbad	Government
13	NIT- National Institute of Technology, Warangal	Government
14	BIT, Mesra, Ranchi	Private
15	NIT- National Institute of Technology, Trichy	Government
16	Delhi College of Engineering. New Delhi	Government
17	Punjab Engineering College, Chandigarh	Government
18	NIT- National Institute of Technology, Suratkal	Government
19	Motilal Nehru National Inst. of Technology, Allahabad	Government
20	Thapar Inst of Engineering & Technology, Patiala	Private
21	Bengal Eng and Science University , Shibpur, Howrah	Government

22	MANIT, Bhopal	Government
23	PSG College of Technology, Coimbatore	Government
24	IIIT, Hyderabad	Government
25	Harcourt Butler Technological Institute, Kanpur	Government
26	Malviya National Institute of Technology, Jaipur	Government
27	VNIT, Nagpur	Government
28	NIT- National Institute of Technology, Kozhikode	Government
29	Dhirubhai Ambani IICT, Gandhinagar	Private
30	Osmania Univ. College of Engineering, Hyderabad	Government
31	College of Engineering , Andhra University, Vishakhapatnam	Government
32	Netaji Subhas Institute of Technology, New Delhi	Government
33	NIT- National Institute of Technology, Kurukshetra	Government
34	NIT- National Institute of Technology, Rourkela	Government
35	SVNIT, Surat	Government
36	Govt. College of Engineering, Pune	Government
37	Manipal Institute of Technology, Manipal	Private
38	JNTU, Hyderabad	Government
39	R.V. College of Engineering, Bangalore	Private
40	NIT- National Institute of Technology, Jamshedpur	Government
41	University Visvesvaraya College of Engg., Bangalore	Government
42	VJTI, Mumbai	Government
43	Vellore Institute of Technology, Vellore	Private
44	Coimbatore Institute of Technology, Coimbatore	Government
45	SSN College of Engineering, Chennai	Private
46	IIIT, Allahabad	Government
47	College of Engineering, Trivandrum	Government
48	NIT Durgapur, Durgapur	Government
49	SIT, Calcutta	Government

50	Mumbai University Inst of Chemical Tech. Mumbai	Government
51	Sardar Patel College of Engineering, Mumbai	Private
52	P.E.S. Institute of Technology, Bangalore	Private
53	Maharashtra Institute of Technology, Pune	Private
54	Amrita Institute of Technology & Science, Coimbatore	Private
55	National Institute of Engineering, Mysore	Private
56	B.M.S. College of Engineering, Bangalore	Private
57	Laxminarayan Institute Of Tech., Nagpur	Government
58	Nirma Institute of Technology, Ahmedabad	Private
59	IIIT, Pune	Government
60	Amity School of Engineering, Noida	Private
61	JNTU, Kakinada	Government
62	S.J. College of Engineering, Mysore	Private
63	Chaitanya Bharathi Inst. of Technology, Hyderabad	Private
64	IIIT, Bangalore	Government
65	SRM Institute of Science and Technology, Chennai	Private
66	SASTRA, Thanjavur	Private
67	Bangalore Institute of Technology, Bangalore	Private
68	The Technological Inst. of Textile & Sciences, Bhiwani	Government
69	III, Gwalior	Government
70	JNTU, Anantpur	Government
71	M.S. Ramaiah Institute of Technology, Bangalore	Private
72	Gitam, Vishakhapatnam	Private
73	NIT- National Institute of Technology, Hamirpur	Government
74	NIT- National Institute of Technology. Jalandhar	Government
75	SV University Engineering College, Tirupati	Government
76	NIT- National Institute of Technology, Raipur	Government
77	Vasavi College of Engineering, Hyderabad	Private

78	The ICFAI Inst of Science and Technology, Hyderabad	Private
79	NIT- National Institute of Technology. Patna	Government
80	Cummins Colleges of Engg of Women, Pune	Government
81	VIT, Pune	Private
82	Shri Ramdeo Baba K.N. Engineering College, Nagpur	Private
83	Muffakham Jah Engineering College, Hyderabad	Private
84	Karunya Institute of Technology, Coimbatore	Private
85	D.J. Sanghvim, Mumbai	Private
86	Sathyabhama Engineering College, Chennai	Private
87	Kongu Engineering College, Erode	Private
88	Mepco Schlek Engineering College, Sivakasi	Private
89	Guru Nanak Dev Engineering College, Ludhiana	Government
90	Hindustan Inst of Engineering Technologym, Chennai	Private
91	SDM College of Engineering, Dharwad	Private
92	R.V.R. & J.C. College Of Engg, Guntur	Private
93	Jamia Millia Islamia, New Delhi, New Delhi	Government
94	K.L. College of Engineering, Veddeswaram	Private
95	Dharmsinh Desai Institute of Technology, Nadiad	Private
96	S.G.S. Institute of Technology & Science, Indore	Government
97	Jabalpur Engineering College, Jabalpur	Government
98	Sree Chitra Thirunal College of Engineering, Trivandrum	Private
99	G.H. Patel College of Engg & Technology, Vallabh Vidyanagar	Government
100	Kalinga Institute of Industrial Technology, Bhubaneshwar	Private

Q. How can I test my aptitude towards Engineering Education/Vocationa?

Take the following Vocational Aptitude Test- Engineering and see your score.

There are 15 questions in this test and time allotted is **<u>10 minutes</u>**. Do the test in one sitting. The figure indicated on right side is the marks allocated for the question. Don't try to cheat yourself.

Full Marks: 70

Study the following passage carefully and answer the relevant questions:

Applicants should have at least a high second class degree in mechanical or electrical engineering and a good extracurricular record. A first class degree is essential for Industrial Engineering and Design & Development. Relevant postgraduate specialization is preferable foe Foundry, Quality control and Industrial Engineering.(From a Trainee Engineers advertisement.)

01. Applicants should be: **2**

a. Civil Engineers

b. Mechanical Engineers

c. Chemical Engineers

d. Agricultural Engineers

02. It is preferable that applicants should have post-graduate specialization for the following branches of engineering:

a. Chemical **2**
b. Civil
c. Industrial
d. Foundry
e. Quality Control.

03. For Industrial Engineering and Design & Development, it is necessary that the candidate should have a:

2

a. First class degree
b. First class diploma
c. Be a first rate singer
d. First class MBA
e. First class CA

04. The method of inquiry in modern experimental science includes which of the following basic steps:

6

a. A statement as to what investigator will personally gain from such inquiry?
b. A statement as to the purpose of inquiry?
c. An evaluation as to how it will serve human progress?
d. Determining what can be presupposed?
e. Steps to be taken in solving the problem?

05. What numbers can fill in the blanks: 9, 8, 18, 16,-------,72,64 ? Are they

4

a. 45 and 18
b. 43 and 61
c. 36 and 32
d. 32 and 36
e. 38 and 36

06. What letters can fill in the blanks: **4**

A, D, II, ___, ___, Z ? are they:

a. P and O
b. M and D
c. O and P
d. E and K
e. M and S

07. Conditioned reflexes can be acquired by: **5**

a. The heart
b. The eyes
c. The stomach glands
d. The mammary glands
e. The urinary bladder

08. Given below are some chemical names. By what are they commonly known? **5**

a. Calcium Carbonate
b. Aluminium Potassium Sulphate

c. Sodium Bicarbonate

d. Methane

e. Calcium Oxide

09. What is an Atomic Pile? Is it: **6**

a. Atom bombs kept in a pile

b. Heavy water

c. One of the first names of the nuclear reactor

d. A device or machine used to produce controlled atomic energy

e. Piled up atoms

10. Answer the following: **10**

a. What great astronomer was born at Thorn (Poland) in 1473?

b. Why is so famous?

c. What is the full form of NASA

d. Name the Indian Astronaut who died in space shuttle STS-07 accident

e. Who flew the first mail flight in India

11. Which of the following are metals? **4**

a. Pallium

b. Palladium

c. Vasculum

d. Spectrum

e. Vanadium

12. Which of the following are poisonous gases: **6**

a.	Thermite	b.	Phosphorite	c.	Lewisite
d.	Kernite	e.	TNT	f.	Dynamite
g.	BBC	h.	Phosgene	i.	OED
j.	Chlorine	k.	DA	l.	KKK
m.	Arsenic	n.	DB	o.	CAD

13. Define **6**

a. Ampere

b. Ohm

c. Volt

d. Coulomb

e. Farad

14. What is Avagardo's law? What is Avagardo's number? **5**

15. Answer the following: **3**

a. Which nation first put man into orbit? What was his name?

b. Who invented computer

c. Who was the first Indian Astronaut

d. What is the full form of NAAC and AICTE

e. What is the full form of IIT, NIT and AIEEE

Score Chart:

01.	63 or above	= Excellent
02.	54 to 62	= Very Good
03.	44 to 53	= Good (Average)
04.	33 to 43	= Fair
05.	Less than 33	= Poor

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