**ASSIGNMENT**

**M. Tech. First Year**

**Structural Engineering**

**To:** **By**:

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M. Tech. First Year

Structural Engineering

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**Engineering**

Engineering is the application of scientific, economic, social, and practical knowledge in order to invent, design, build, maintain, research, and improve structures, machines, devices, systems, materials, and processes.

**History and Examples**

The exact origin of the word 'engineering' comes from the era when humans applied themselves to skilful inventions. Man evolving further in the world invented devices such as the pulley, the wheel and levers. The word engineer has its root in the word engine, which comes from the Latin word ingenium, which means "innate quality particularly of mental power". And thus the word engineer emerged as a person who creates nifty and practical inventions.

The field of engineering has traditionally been divided into the following engineering job categories:
Aerospace Engineering
Chemical Engineering
Civil Engineering
Electrical Engineering and,
Mechanical Engineering.

However, since the human race has been swiftly advancing with regards to technology, new branches of engineering are being developed. Engineering jobs can now also be found in the following fields:
Computer Engineering,
Software Engineering,
Nanotechnology,
Molecular Engineering and many more!

**Examples of Old Engineering**

Boats and Ships of Ancient World

Steam Engine

Watch etc.

**Civil Engineering**

Civil engineering is a professionalengineering discipline that deals with the design, construction, and maintenance of the physical and naturally built environment, including works like roads, bridges, canals, dams, and buildings.

**History of Civil Engineering**

It is difficult to determine the history of emergence and beginning of civil engineering, however, that the history of civil engineering is a mirror of the history of human beings on this earth. Man used the old shelter caves to protect themselves of weather and harsh environment, and used a tree trunk to cross the river, which being the demonstration of ancient age civil engineering.

Civil Engineering has been an aspect of life since the beginnings of human existence. The earliest practices of Civil engineering may have commenced between 4000 and 2000 BC in Ancient Egypt and Mesopotamia (Ancient Iraq) when humans started to abandon a nomadic existence, thus causing a need for the construction of shelter. During this time, transportation became increasingly important leading to the development of the wheel and sailing.

Until modern times there was no clear distinction between civil engineering and architecture, and the term engineer and architect were mainly geographical variations referring to the same person, often used interchangeably. The construction of Pyramids in Egypt (2700-2500 BC) might be considered the first instances of large structure constructions.

**Structural Engineering**

Structural engineering is a field of engineering dealing with the analysis and design of structures that support or resist loads.

**History of Structural Engineering**

The history of [structural engineering](https://en.wikipedia.org/wiki/Structural_engineering) dates back to at least 2700 BC when the [step pyramid](https://en.wikipedia.org/wiki/Step_pyramid) for [Pharaoh](https://en.wikipedia.org/wiki/Pharaoh) [Djoser](https://en.wikipedia.org/wiki/Djoser%22%20%5Co%20%22Djoser) was built by [Imhotep](https://en.wikipedia.org/wiki/Imhotep%22%20%5Co%20%22Imhotep), the first engineer in history known by name. [Pyramids](https://en.wikipedia.org/wiki/Pyramid) were the most common major structures built by ancient civilizations because it is a structural form which is inherently stable and can be almost infinitely scaled (as opposed to most other structural forms, which cannot be linearly increased in size in proportion to increased loads). Another notable engineering feat from antiquity stiil in use today is the qanat water management system. [Qanat](https://en.wikipedia.org/wiki/Qanat%22%20%5Co%20%22Qanat) technology developed in the time of the [Medes](https://en.wikipedia.org/wiki/Medes), the predecessors of the [Persian Empire](https://en.wikipedia.org/wiki/Persian_Empire) (modern-day [Iran](https://en.wikipedia.org/wiki/Iran) which has the oldest and longest Qanat (older than 3000 years and longer than 71 km) that also spread to other cultures having had contact with the Persian.

**Best Example of Structural Engineering**

* [Taj Mahal](http://en.wikipedia.org/wiki/Taj_Mahal)
* Pyramids
* [Burj Al Arab](http://en.wikipedia.org/wiki/Burj_Al_Arab)
* [Eiffel Tower](http://en.wikipedia.org/wiki/Eiffel_Tower)
* The Great Wall of China
* Sydney Opera House
* Golden Gate Bridge
* Burj Khalifa
* World Kingdom Tower Jeddah(Project not completed)

**Building**

A building is a man-made [structure](https://en.wikipedia.org/wiki/Built_structure) with a [roof](https://en.wikipedia.org/wiki/Roof) and [walls](https://en.wikipedia.org/wiki/Wall) standing more or less permanently in one place, such as a [house](https://en.wikipedia.org/wiki/House) or [factory](https://en.wikipedia.org/wiki/Factory). Buildings come in a variety of shapes, sizes and functions, and have been adapted throughout history for a wide number of factors, from [building materials](https://en.wikipedia.org/wiki/Building_material) available, to weather conditions, to land prices, ground conditions, specific uses and aesthetic reasons.

**Structural Design**

Structural design is the methodical investigation of the stability, strength and rigidity of structures. The basic objective in structural analysis and design is to produce a structure capable of resisting all applied loads without failure during its intended life.

**History and Examples of structural design**

Almost all the wonders of world are best examples of history of design of structures and their history is also known to us.

The best example in India is The Taj Mahal which was built by Shahjahan in memory of his bellowed wife Mumtaj Mahal.

Other Best Example of Structural designs are The Taj Hotel in Mumbai, Pragati Maidan of Delhi, Lotus Temple etc.

And if we talk in world about the best designs then there are is a bunch of building known for their unique and ultimate engineering design like Burj Khalifa, Kingdom tower, Pentagon, Angkor Waat Temple etc.

**Structural analysis**

It is the determination of the effects of loads on physical structures and their components. Structures subject to this type of analysis include all that must withstand loads, such as buildings, bridges, vehicles, machinery, furniture, attire, soil strata.

[**History of Structural Analysis**](http://engineerstandpoint.blogspot.in/2010/09/history-of-structural-analysis.html)

Structural Analysis as we know it today evolved over several thousand years. During this time many types of structures such as beams, arches, trusses and frames were used in construction for Hundred or even thousand of years before satisfactory methods of analysis were developed for them.
While ancient engineers showed some understanding of structural behavior real progress with the Theory of Structural Analysis occurred only in the past 150 years.

The Egyptians and other ancient builders surely had some kinds of empirical rules drawn from previous experiences for determining sizes of structural members. There is, However, no evidence that they had developed any Theory Of Structural Analysis. The Egyptian Imhotep built the great PYRAMID of Saqqara (the Step pyramid of Djoser, Egypt's first pyramid) in circa 2630 B.C. sometimes is referred to as the world's first Structural Engineer and master builder.