DOWNLOAD PDF TYPES OF STRUCTURES IN CIVIL ENGINEERING

Chapter 1 : Supports and Connections | SkyCiv Cloud Structural Analysis Software

There are almost as many types as there are different buildings. I don't think I could give a precise number. Just in terms of materials employed there is wide variation. Besides three major construction materialsâ€" steel, concrete and wood â€" there is also stone, aluminum, copper, even grass.

This involves facilities and structures such as arenas, large-scale monuments, government buildings, transportation routes as well as other structures. Engineers will either work for the city or for a private firm that has been hired by the city. Some civil engineers work in the private sector on projects for independent companies. Types of Civil Engineering Branches There are several types of civil engineering. A civil engineer can specialize in a number of different civil engineering branches. Those branches are described briefly below. You may also like to know about what civil engineers do. Construction Engineering This civil engineering branch deals with the planning, construction and maintenance of structures. Construction engineering is the planning and execution of designs from site development, environmental, structural, transportation and structural engineers. They must ensure that the plans that have been designed by other engineers are implemented to their exact specifications. Construction engineers will supervise fieldwork during the entire project. They are in a sense a cross between an engineer and manager as they will oversee the project from start to finish and handle any problems that come up throughout the duration of the project. Structural Engineering This branch of civil engineering encompasses the structural analysis and design of structures. It is the responsibility of the structural engineer to analyze and design a structure that will safely bear or resist the stresses, forces and loads. The design must satisfy the project specifications while meeting all safety regulations. The structure must endure massive loads as well as natural disasters and climate changes. Geotechnical Engineering In geotechnical engineering, the studies of a civil engineer include soil, foundations, bearing capacities etc. The engineer will study the behavior of the earth materials and how they will affect a structure that is to be constructed. They will also evaluate pre-existing structures that are showing signs of problems with the earth materials under or near the structure. Transportation Engineering Civil engineers that specialize in transportation engineering will work with the planning, construction and management of transportation facilities. They will design and implement the infrastructures that deal with transportation in order to provide a safe, comfortable, convenient, economical and environmentally compatible mode of transport. There are six divisions related to transportation engineering: Surveying This type of civil engineering branch handles the surveying and leveling of land by using different instruments to map and contour the terrain. This is done to locate and measure property lines, layout buildings, bridges, channels, highways, and pipelines for constructions. Surveyors are generally classified into two categories: Water Resource Engineering These engineers deal with the design and construction of hydraulic structures. These structures include dams, canals and water distribution system. The engineer is responsible for the design of the structure as well as the implementation and safety precautions that must be closely adhered to when dealing with hydraulic structures. Environmental Engineering This civil engineering type is the study of environment-friendly designs, pollution and their resolutions and sewage management. Many engineers focus solely upon the crisis of pollution and coming up with solutions as well as determining new and inventive ways for sewage management and other environmental entities. Municipal Engineering These engineers will work with urban or city governments on the planning and management of the township. Most of these engineers work directly with government officials to ensure that the structures within the municipality are properly designed and implemented. Coastal Engineering This branch of civil engineering deals with coastal and marine structures. These structures include groynes and embankments. These engineers not only ensure that the structures being erected correctly but they are also concerned with not disturbing the coastal regions. Tunnel Engineering Civil engineers who specialize in tunnel engineering are responsible for the planning, designing, construction, safety and maintenance of tunnels. There are specifications that must be adhered to when working with tunnels for roadways, waterways or trains. Earthquake Engineering Earthquake engineers study the seismic forces and earthquake resistant structures. In regions that are known for seismic activities,

engineers must design and construct structures based on how well they will react within an earthquake situation. Material Engineering This branch of civil engineering deals with the study of material strength, properties of materials used in construction and ceramics.

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Chapter 2 : Structural engineering - Wikipedia

A type of structure formed by members in triangular form, the resulting figure is called a truss. In truss joints are pin connected and loads are applied at joints. In truss joints are pin connected and loads are applied at joints.

When any body is subjected to a system of loads and deformation takes place and the resistance is set up against the deformation, then, the body is known as structure. The structure are means of transferring forces and moments. The structures may be classified as statistically determinate structures and statistically indeterminate structures. When the equations of statistics are enough to determine all the forces acting on the structures, in the structures, then, the structures are known as statistically determinate structures. Design of Steel Structures When the equations of statistical equilibrium are not sufficient to determine all forces acting on the structure and in the structures, then the structures are known as Statistically Indeterminate Structures. The equations of consistent deformations are added to the equations of equilibrium inorder to analyse the Statistically Indeterminate Structures. Classification of Structures The structures are categorised by their supporting systems. There are one dimensional, two dimensional and three dimensional supporting systems. When a supporting system is subjected to only one type of stresses, then, it is known as basic system. When a system is subjected to simultaneously several types of stresses, then it is known as mixed system. The Line supporting structure is large in one dimension and small in other two dimensions. The material remains concentrated along a straight, curved or angular line. Two Dimensional supporting systems can also be called as surface structures. The surface structures is large in two dimensions and small in the third dimension. The material remains distributed along the surface. The surface maybe plain or curve. The curved surface may possess single or double curvature. A surface structure may also consist of line elements that form a continuous structure. The framed structures are examples of surface structures made of line elements. The framed structures are built by assemblies of elongated members. The shell structures are rigid curved surface structures. They are built of sheets or plates. The shell roof coverings for large building, planes, airplanes, railroads, cars, ship bulls, tanks etc are the examples of shell structures. Three dimensional structures are large in all three dimensions and these structures may have any shape. The three dimensional structures are also called Space Structures. The three dimensional framed structures are also Space Structures. The structures may be further classified depending on the material used as Plastic Structures, aluminium structures, timber Structures, RCC Structures and Steel Structures. The structural steel is used for the steel structures. The high strength and ductility are the properties of the particular importance for the structural use of the steel. The ductility is the unique property by virtue of which it is able to deform substantially either in tension or compression before failure. The structure can also be divided into following three categories: Skeletal Structures Stressed Skin Structures Solid Structures Studying the classification of structures will help us understand the flow and concept designing various steel structures of varied designs.

Chapter 3 : 12 Types of Civil Engineering Branches

Civil engineering is the design, implementation and maintenance of public works. This involves facilities and structures such as arenas, large-scale monuments, government buildings, transportation routes as well as other structures.

The surface may be horizontal, vertical or slopped at any angle. Roller supports are commonly located at one end of long bridges in the form of bearing pads. This support allows bridge structure to expand and contract with temperature changes and without this expansion the forces can fracture the supports at the banks. This support cannot provide resistance to lateral forces. Roller support is also used in frame cranes in heavy industries as shown in figure, the support can move towards left, right and rotate by resisting vertical loads thus a heavy load can be shifted from one place to another horizontally. Hinge Supports The hinge support is capable of resisting forces acting in any direction of the plane. This support does not provide any resistance to rotation. The horizontal and vertical component of reaction can be determined using equation of equilibrium. Hinge support may also be used in three hinged arched bridges at the banks supports while at the center internal hinge is introduced. It is also used in doors to produce only rotation in a door. Hinge support reduces sensitivity to earthquake. They are also known as rigid support For the stability of a structure there should be one fixed support. A flagpole at concrete base is common example of fixed support In RCC structures the steel reinforcement of a beam is embedded in a column to produce a fixed support as shown in above image. Similarly all the riveted and welded joints in steel structure are the examples of fixed supports Riveted connection are not very much common now a days due to the introduction of bolted joints. It can resist both vertical and horizontal forces but not a moment. It allows the structural member to rotate, but not to translate in any direction. Many connections are assumed to be pinned connections even though they might resist a small amount of moment in reality. It is also true that a pinned connection could allow rotation in only one direction; providing resistance to rotation in any other direction. In human body knee is the best example of hinged support as it allows rotation in only one direction and resists lateral movements. Ideal pinned and fixed supports are rarely found in practice, but beams supported on walls or simply connected to other steel beams are regarded as pinned. The distribution of moments and shear forces is influenced by the support condition. For example in above fig two halves of an arch is joined with the help of internal hinge. In some cases it is intentionally introduced so that excess load breaks this weak zone rather than damaging other structural elements as shown in above image. Stay informed - subscribe to our newsletter.

Chapter 4 : Civil Engineering Structures

Structural engineering is one of the oldest forms of civil engineering and has been around for hundreds of years. Structural engineering jobs tend to be in high demand due to the necessity of non-building structures no matter what the population is.

Daniel Bernoulli introduced the principle of virtual work â€" Leonhard Euler developed the theory of buckling of columns Claude-Louis Navier published a treatise on the elastic behaviors of structures Carlo Alberto Castigliano presented his dissertation "Intorno ai sistemi elastici", which contains his theorem for computing displacement as partial derivative of the strain energy. This theorem includes the method of "least work" as a special case Otto Mohr formalized the idea of a statically indeterminate structure. Alexander Hrennikoff solved the discretization of plane elasticity problems using a lattice framework Courant divided a domain into finite subregions Structural failure and List of structural failures and collapses The history of structural engineering contains many collapses and failures. The final collapse killed 94 people, mostly children. In other cases structural failures require careful study, and the results of these inquiries have resulted in improved practices and greater understanding of the science of structural engineering. Some such studies are the result of forensic engineering investigations where the original engineer seems to have done everything in accordance with the state of the profession and acceptable practice yet a failure still eventuated. A famous case of structural knowledge and practice being advanced in this manner can be found in a series of failures involving box girders which collapsed in Australia during the s. Structural engineering theory Figure of a bolt in shear stress. Top figure illustrates single shear, bottom figure illustrates double shear. Structural engineering depends upon a detailed knowledge of applied mechanics , materials science and applied mathematics to understand and predict how structures support and resist self-weight and imposed loads. To apply the knowledge successfully a structural engineer generally requires detailed knowledge of relevant empirical and theoretical design codes , the techniques of structural analysis , as well as some knowledge of the corrosion resistance of the materials and structures, especially when those structures are exposed to the external environment. Such software may also take into consideration environmental loads, such as from earthquakes and winds. Structural engineer Structural engineers are responsible for engineering design and structural analysis. Entry-level structural engineers may design the individual structural elements of a structure, such as the beams and columns of a building. More experienced engineers may be responsible for the structural design and integrity of an entire system, such as a building. Structural engineers often specialize in particular types of structures, such as buildings, bridges, pipelines, industrial, tunnels, vehicles, ships, aircraft and spacecraft. Structural engineers who specialize in buildings often specialize in particular construction materials such as concrete, steel, wood, masonry, alloys and composites, and may focus on particular types of buildings such as offices, schools, hospitals, residential, and so forth. Structural engineering has existed since humans first started to construct their own structures. It became a more defined and formalized profession with the emergence of the architecture as distinct profession from the engineering during the industrial revolution in the late 19th century. Until then, the architect and the structural engineer were usually one and the same thing â€" the master builder. Only with the development of specialized knowledge of structural theories that emerged during the 19th and early 20th centuries, did the professional structural engineers come into existence. The role of a structural engineer today involves a significant understanding of both static and dynamic loading, and the structures that are available to resist them. The complexity of modern structures often requires a great deal of creativity from the engineer in order to ensure the structures support and resist the loads they are subjected to. A structural engineer will typically have a four or five year undergraduate degree, followed by a minimum of three years of professional practice before being considered fully qualified. Structural engineers are licensed or accredited by different learned societies and regulatory bodies around the world for example, the Institution of Structural Engineers in the UK.

Chapter 5 : What is structural engineering | UNSW Civil & Environmental Engineering

This set of Basic Civil Engineering Multiple Choice Questions & Answers (MCQs) focuses on "Types of Structures". 1. Pyramid is a type of _____ structure.

This field deals with construction, design and maintenance of built structures. The profession is practiced both in the public and in private sector. Civil engineer qualification requires a minimum of 4-year degree and a formal licensure to practice. The common civil engineer works are the structural designs and the construction sector. The group of engineers here are under constant pressure to offer their services in the ever-demanding structures, buildings and common constructions, which people use daily. Here is the list of common types of civil engineering jobs in this industry Transport engineering â€" involves building structures such as bridges, tunnels and freeway interchanges to facilitate flow of traffic while allowing expansion and other higher use of traffic structures. Structural engineering â€" involves an analysis and design of buildings and nonbuilding structures. This is the most wide and most common civil engineering discipline. This specialty lays emphasis on structural integrity, function and safety. This sub-discipline is also known as sanitary engineering and included assessing the environment for the effect of proposed actions such as hazardous waste disposal. Geotechnical engineering â€" this area involves the rock and the soil where civil structures are standing. This civil engineering niche design foundations and retaining walls with the help of geology, material science and testing knowledge. Constructions engineering â€" involves executing structural and civil designs including transportation, environmental, geotechnical and site developments. Construction engineering doubles up as civil engineering logisticians, contract reviewers and monitoring market prices for constructions supplies. Construction engineers are ever on high demand and always have regular jobs with the best remuneration in this industry. Control engineering â€" involves designing and creating systems with desired behaviors. This field applies sensors to measure the desired output performance without human presence. The best example of control engineering is space flight equipment and explorations. Municipal or urban engineering â€" involves cities and towns infrastructures designs. It includes, designing , construction and maintaining streets sidewalks and lighting system, water and sewer supply systems, solid waste and disposal management, electricity and telecommunications networks, public transport services networks and bus stations. Coastal engineering â€" is usually a civil engineering discipline concerned with management of coastal areas for flooding and erosion. Forensic engineering â€" involves investigating the materials, structures and components that fail to work as intended. These materials or structures might cause injury or damage property and the law of liability comes in here. A job in civil engineering however requires high concentration and heavy investment in mathematics and science. Additionally, all types of civil engineering jobs require a degree and a license. However, having a postgraduate qualification makes you a much more attractive candidate in the civil engineering industry.

Chapter 6 : Landslides, Its Types And Effect In Civil Engineering Structures - Ravi Dhami

Most important for civil engineering different types of loads acts on structure wind load, seismic loads, earthquake loads, dead loads, live loads, erection loads and all different types of forces that act on the structure.

A Career in Civil Engineering is both challenging and rewarding. Help build the next skyscraper, bridge or highway and create structures that stand the test of time. Learn more about how to become a civil engineer here: Civil Engineering Structures A large part of civil engineering deals with the structures which define our society. This has been true throughout the history of mankind. Today, the structures that ancient engineers have left behind help us understand the people who lived before us, how they lived, the wars that they fought and the gods that they served. To be able to transport water over such long distances, without the use of pumps and pipes was a true technological challenge. Even today, the work of civil engineers, modifies the environment around us, creates space where we can live, work and play. While the structures which we see most commonly are buildings, civil engineering deals with many other structures as well, include dams, roads, bridges, tunnels, water treatment plants and more. Dams The Hoover dam, the second largest dam in the United States was an engineering marvel in its day. It is sited on the Colorado River, at the border between Arizona and Nevada, creating Lake Mead, which stretches miles upstream to the Grand Canyon. This dam takes advantage of the naturally existing canyon, which is an extension of the Grand Canyon to provide its foundation as well as room for the lake it created. Upon its completion in , it was the tallest dam in the world. Although many have since surpassed it, it is still in the top One of the great challenges which faced the civil engineers in the creation of the Hoover Dam was in diverting the flow of the Colorado River while the dam was being created. To accomplish this, they dug four diverter tunnels through the solid rock of the canyon walls. At the time of its building, the Hoover Dam required more concrete than had ever been used in a single structure. Engineers on the project calculated that such a large volume of concrete would require 75 years to fully set. Since that was unacceptable, they designed a series of cooling pipes, carrying cold water throughout the dam, cooling the concrete. This allowed it to set considerably faster. At the time, this was a revolutionary method, which had never been attempted before and was invented just for the construction of the Hoover Dam. At 2, feet tall, it created special challenges for the civil engineering team who designed it. Added to this were the high winds which upper floors of the building would be subjected to. The foundation consists of holes, bored 1. These pilings are all connected to a 12 foot thick raft-type foundation, which is as big as the entire footprint of the building. Besides the foundation, the other major structural element of any skyscraper is the core. This reinforced cement structural element is in the center of the floor, and typically contains the elevator shafts and stairwells. However, its primary purpose is to support the floors and skin of the building. This combination provides excellent strength for both vertical and lateral loads. By adding a twist, the structural engineers were able to ensure that wind would not be able to strike one face of the building throughout its entire height. That reduces the potential lateral forces on the structure. All in all, the Burj Khalif is a remarkable feat of structural engineering. Bridges Building bridges creates a totally different type of challenge to the civil engineer. Throughout the course of its construction, the sections of the bridge are cantilevered, solely supported by their own structural strength and attachment to the towers. Successful suspension bridge designs combine various structural elements to carry their load. The purpose of the suspension cables is to transfer the weight of the bridge deck or roadbed and vehicle load to the towers, which are anchored to bedrock. Since both steel and concrete are extremely strong under compression, this allows even delicate looking towers to carry an incredible amount of load. However, without a complete roadbed, the cables cannot be taut. This means that the roadbed must support itself, until it is joined together in the midst of the span and all the cables are in place. To accommodate this need and provide stiffness to the roadbed, trusses are attached to the underside of the roadbed. Without sufficient truss strength to stiffen the roadbed, it would undulate like the Tacoma Narrows Bridge, which collapsed in Construction of these bridges has to be accomplished by working from the towers outward. To try and build the bridge only in one direction from the tower, without building it in the other direction, would cause the structure to become out of balance, with the

towers leaning towards the side that has the weight of the roadbed attached to it. This would cause permanent damage to the columns. Each of these structures, like every other structure which civil engineers work on, has its own design challenges. The civil engineers who work on these projects start by understanding the problems which they are faced with. The design process consists of finding solutions to those problems, then challenging those solutions, to ensure that the resulting structures will be safe.

Chapter 7 : List of engineering branches - Wikipedia

The Civil Engineering with architecture provides for an appreciation of architectural principles and an understanding of both the architect's role in construction and the interaction between architects and engineers.

Chapter 8 : Types of Supports for Loads | Roller, Hinge, Fixed, Pin, Internal Hinge Supports

While the structures which we see most commonly are buildings, civil engineering deals with many other structures as well, include dams, roads, bridges, tunnels, water treatment plants and more. Dams The Hoover dam, the second largest dam in the United States was an engineering marvel in its day.

Chapter 9 : Different types of loads on a structure in civil engineering

Different types of structure in civil engineering. Definition, specifications, example. Load bearing structure, framed structure and composite structure Thanks for watching my vedio #civil #.