

## ***Lesson 1: What is civil engineering?***

Civil engineering is a professional engineering discipline that deals with the design, construction, and maintenance of built environment, including public works such as roads, bridges, canals, dams, airports, sewerage systems, pipelines, structural components of buildings, and railways.

A civil engineer is a person who practices civil engineering.

### ***Branches of Civil Engineering***

- Construction Engineering: Deals with planning, construction, maintenance of structures and structural Analysis.
- Public Works: Deals with planning, construction and management of transportation facilities (Roads and bridges, etc.).
- Geotechnical Engineering: Study of soil, foundations, bearing capacity, etc.
- Material Engineering: Study of Material Strength, properties of materials used in construction (cement, gravel, sand, etc.)
- Topography: Deals with surveying and leveling of lands using various instruments (theodolite, dumpy levels, etc.), mapping & contouring of terrains, etc.

### ***I) - Reading comprehension***

#### ***A) - Answer the following questions:***

- 1) What is the main role of civil engineering?

***The main role of civil engineering is the design, construction, and maintenance of built environment***

- 2) According to the text, what are the different fields of civil engineering?

***The different fields of civil engineering are: Construction Engineering, Public Works, Geotechnical Engineering, Material Engineering and Topography***

#### ***B) - Say whether the following statements are: True / False / Not mentioned.***

- 1) The crane is among the instruments used in the topography ***False***
- 2) Structural Analysis enters the field of Construction Engineering ***True***
- 3) Slump test is a test that enters within the domain of Material Engineering. ***Not mentioned.***

**II) - Lexis :**

**A) - Find in the text words that are similar in meaning to the following:**

- Domains = **Branches**
- Building = **Structures**
- Way = **Road**

**B) - Fill in the gap in the text below with the following appropriate words**

*specializations - engineer - comfort - structures - design*

A civil .. **engineer**. is concerned with determining the right ... **design** ... for these structures and looking after the construction process so that the longevity of these ... **structures** .... is guaranteed after completion. These structures should also be satisfactory for the public in terms of... **comfort** ... . Some civil engineers, particularly those working for government agencies, may practice across multiple... **specializations**..., particularly when involved in critical infrastructure development or maintenance.

**III) - Translate into French the following terms :**

Public works = **Travaux Publics**

Soil = **Sol**

Bridges = **Ponts**

Bearing capacity = **Capacité portante.**

Dams = **Barrages**

Strength = **Force / Résistance**

Airports = **Aéroport**

Materials = **Matériaux**

Sewerage systems = **L'assainissement**

Cement = **Ciment**

Buildings = **Immeubles**

Gravel = **Gravier**

Railways = **Les chemins de fer**

Sand = **Sable**

Structural Analysis = **Analyse structurelle**

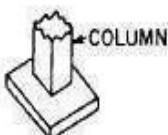

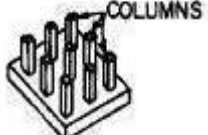
Crane = **Grue**

## Lesson 2: Components of a Building Structure

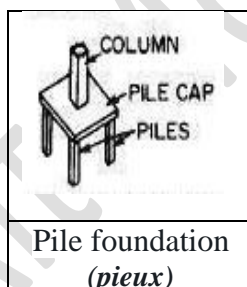
The basic components of a building structure are the **foundation (footing)**, **columns**, **beams**, **floors**, **walls**, **roof**, **stair**, **shear wall (concrete shell)** etc. These elements serve the purpose of supporting, enclosing and protecting the building structure.

Foundation is one of the most important parts of the structure. There are different types of soil and bearing capacity of the soil is different for each type of soil. So depending on the soil profile, size and load of the structure, engineers chose different types of foundation.

### 1- Shallow foundation:

		
Isolated footing ( <i>semelle isolée</i> )	Strap footing ( <i>semelle filante</i> )	Raft footing ( <i>radié</i> )

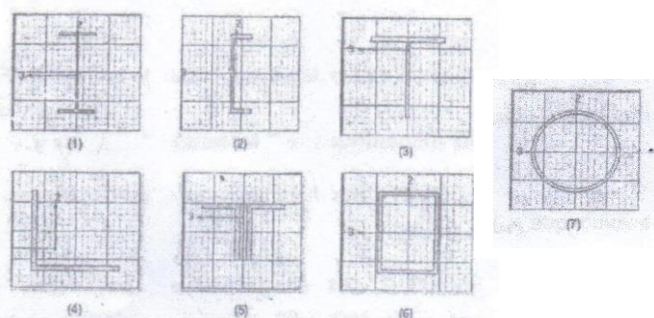
### 2- Deep foundation



In the building structure fields, we find also steel construction who products such as buildings, sheds (hangars), bridges, footbridge, stairs, conservatories and railings.

For the field of metal construction, there are a wide variety of steel shapes available. The most common shapes for elements structure are listed below:

- (1) Wide Flange
- (2) Channel
- (3) Tee
- (4) Angle
- (5) Double Angle
- (6) Box/Tube
- (7) Pipe



**I) - Reading comprehension****A) - Answer the following questions:**

1- From the text, cite the supporting, enclosing and protecting elements of structure?  
*the supporting elements of structure are: foundation, columns, beams, floors, shear wall*  
*the enclosing and protecting elements of structure are: walls, roof.*

2- Depending to what, engineers chose different types of foundation?  
*types of soil, bearing capacity of the soil and size and load of the structure,*

3- What is the building material mentioned in the text?  
*The Steel*

**B) - Say whether the following statements are: True / False / Not mentioned.**

- 1- Strap footings are a type of deep foundation. *False*
- 2- The wide flange is a shape of element structure for metallic structure. *True*
- 3- Stainless steels are most notable for their corrosion resistance. *Not mentioned*

**II) - Lexis:****A) - Give the synonyms or the opposite of the following words:**

- Profound = *deep*
- Fresh concrete  $\neq$  *hardened concrete*
- Workability = *slump*

**B) - Fill in the gap in the text below with the following appropriate words:**

*tensile - compressive - the creep - shrinkage - permeability - Workability.*

- ..... *Workability* ..... is a fresh concrete properties.
- The Mechanical strengths of concrete are: ... *compressive*... strength and ... *tensile* ....strength.
- Among the durability properties of hardened concrete we find: ... *the creep*... , ... *shrinkage* .... and ..... *permeability* ...

**III) - Translate into French the following terms :**

Footing = *fondation*. / column = *poteau* / beam = *poutre* / floors = *plancher* / roof = *toit*  
 / stair = *escalier*. / shear wall (concrete shell) = *voile* / bearing capacity = *capacité portante*. / load = *charge* / shed = *hangars* / Stainless steels = *acier inoxydable* / bridge = *pont*. / footbridge = *passerelle* / conservatories = *vérandas* / railings = *garde-corps* .

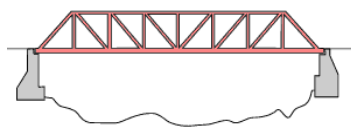
## Lesson 3: Different Types of Bridges & its components

### 1- Beam bridge or Stringer Bridge or Girder bridge:



This is one of the basic types of bridges. These types of bridges are simply supported bridges consisting of horizontal beams and vertical piers. These types of bridges are typically spanned with two or more spans and supported by pier at each end. These types of bridges are constructed using prestressed concrete, steel etc. Beam bridges have span less than 80m.

### 2- Truss Bridge:



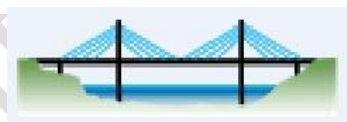
Truss is a framework consisting of struts (inclined members). These bridges are constructed by using trusses which are comprised of many small elements forming triangular trusses. The span length of truss bridge is in between 50m-110m.

### 3- Suspension bridges:



These types of bridges are constructed by suspending the deck slab using suspension cables. These suspension cables are attached to tow supporting cables which are connected to two towers and secured by anchors on both ends of the bridge. The span length of Suspension bridge is in between 150m-2000m

### 4- Cable-stayed bridge:



These types of bridges are modern bridges and it is similar to the suspension bridge. In this type, cables are connected directly to the tower instead of suspended cables. Tension is constantly acting on the cables. The span length of Cable stayed bridge is in between 500m-1000m.

### 1) - Reading comprehension

#### A) - Answer the following questions:

1- What is the role of anchors in suspension bridges?

*The role of anchors in suspension bridges is to attach the tow supporting cables and secured the two towers.*

2- What is the type of concrete used in Beam Bridge?

*In Beam Bridge the Prestressed concrete is used.*

3- What is the difference between a suspension bridge and cable stayed bridge?

*The cables are connected directly to the tower.*

**B) - Say whether the following statements are: True / False / Not mentioned.**

1- Prestressed concrete is used in the successive cantilever bridge. **Not mentioned.**

2- The maximum span length of truss bridge is 150m. **False**

3- An arch bridge is the most popular type of bridge. **Not mentioned.**

## **II) - Lexis:**

**A) - Give the opposite of the following words:**

- Coarse aggregates  $\neq$  ...***fine aggregates***.....

- Top flange  $\neq$  ...***bottom flange***.....

- Pre-tensioned  $\neq$  ...***Post-tensioned***....

**B) - Fill in the gap in the text below with the following appropriate words:**

*Hardy slab - the joists - dead load - earthquake - Hardy slab - live load.*

- An ... ***earthquake*** ... is the shaking of the surface of the earth.

- The load combination is: 1.35 of ... ***dead load***.. + 1.5 of ... ***live load*** ..

- ... ***Hardy slab***... is constructed by hardy Bricks. Hardy blocks are placed between ... ***the joists***...

## **III) - Translate into French the following terms:**

span = ...***travée***. / prestressed concrete = ***béton précontraint***. / truss beam = ***poutre en treillis*** / stories = ***étages*** / earthquake = ***tremblement de terre*** / load = ***charge***. / hardy slab = ***plancher en corps creux*** / live load = ***surcharge d'exploitation***. / dead load = ***charge permanente*** / the joists = ***les solives*** / anchors = ***ancrages*** / Top flange = ***semelle supérieure*** / web thickness = ***épaisseur de l'âme*** / wind load = ***charge de vent*** / snow load = ***charge de neige***. / self-compacting concrete = ***béton auto-plaçant***