**MILA UNIVERSITY CENTER**

** Department of Civil Engineering and Hydraulics**

**Course : Reinforced Concrete 1**

**TD : SERIES OF EXERCISES No. 01**

***(Formulation and Mechanical Properties of Reinforced Concrete)***

**Exercise 0 1 :**

The table below summarizes the results of a tensile test conducted on a high-carbon steel specimen that has been heat-treated. F represents the applied load on the specimen, and ΔL is its elongation.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **F (kN)** | 0 | 45.86 | 72 | 93.2 | 115.4 | 130 | 149.6 |
| **Δ L (mm)** | 0 | 0.0255 | 0.035 | 0.046 | 0.0535 | 0.076 | 0.101 |
| **F (kN)** | 180.34 | 190.16 | 202.43 | 214.4 | 227 | 235 | rupture |
| **ΔL (mm)** | 0.254 | 0.355 | 0.508 | 0.762 | 1.016 | 1.27 |  |

* The initial diameter of the specimen is 17.68 mm, and the tested length is 25 mm.
* Plot the stress (σ) - strain (ξ) graph.?

**Exercise 02 :**

Calculate the approximate compressive strength of concrete at 4, 10, and 21 days, knowing that at 28 days, it should reach fc28 = 30 MPa.

Calculate the tensile strength of the concrete ft28.

**Exercise 03 :**

1. Calculate the stress due to shrinkage in a reinforced concrete beam with a section of 15 cm x 50 cm, knowing that:

* Its ends are connected to concrete blocks.
* The climate is humid.

fc28 = 30 MPa.

1. What is the effect of shrinkage (concrete cracking or not)?

**Exercise 04 :**

Determine the unit elongation corresponding to a stress of 348 MPa applied to FeE400 steel.

**Note** : The deformation is considered within the elastic domain.

**Exercice 5 :**

The characteristic compressive strength of concrete at 28 days is 23 MPa.

* What is the design stress (fbu) knowing that the load application duration is greater than 24 hours?

------- Fin de la série. -------