MILA UNIVERSITY CENTER
Department of Civil Engineering and Hydraulics

Course : Reinforced Concrete 1

TD : SERIES OF EXERCISES No. 04

(Simple Compression)

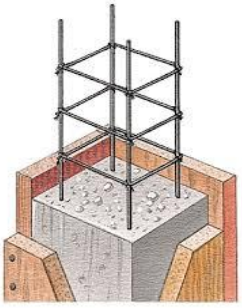
Exercise 0 1 :

Determine the steel reinforcement area for a rectangular-section column located on a typical floor of a building and subjected to compressive loads. The geometric characteristics of the column are as follows:

Steel type: FeE400
Concrete type: fc28 = 24 MPa
Cracking case: Considered as prejudicial

Loads:

Permanent load G = 368 kN ,Variable load Q = 148 kN
Effective length: L_0 = 3.00 m
Section dimensions: a × b = 18 cm × 25 cm



Note: The majority of the loads are assumed to be applied after 90 days.

Exercise 02 :

Design the reinforcement of an interior reinforced concrete column subjected to a concentric compressive axial force.

Ultimate axial load (ULS): Nu = 850 kN

Column section: 25 cm × 25 cm

Buckling length: lf = 3.2 m

More than half of the load applied before 90 days

Concrete characteristic strength: fc28 = 30 MPa

Concrete made with medium gravel (sieve size: 8 to 12.5 mm)

Steel reinforcement: High Adherence steel, Fe = 400 MPa

Exercise 03 :

An isolated column in an industrial building is subjected to an ultimate compressive axial load Nu = 1.9 MN. Its effective length is L_0 = 3.00 m. The column is fixed at the base (foundation) and pinned at the top.

Concrete characteristic strength: fc28 = 25 MPa

Steel reinforcement: FeE = 400 MPa

Assume slenderness ratio $\lambda \approx 35$

Column cross-section is circular

Tasks:

Determine the dimensions of the cross-section.

Calculate the full reinforcement of the column.

Provide a sketch of the reinforcement layout on the column cross-section.

------- End of the Series -------