

**Birzeit University**  
**Faculty of Engineering**  
**Department of Civil and Environmental Engineering**

**ENCE 335, Reinforced Concrete Design I**

**Homework assignment #4**

**Due on Monday, Nov. 9<sup>th</sup>, 2019 @ 11:59 PM.**

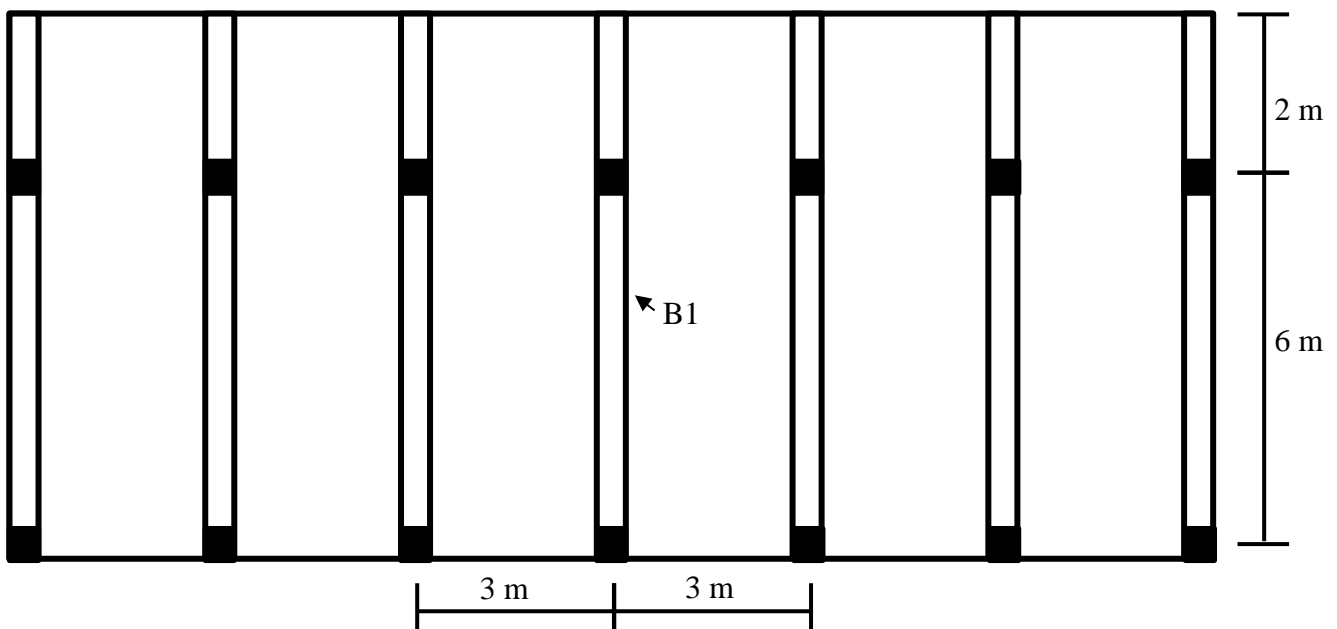
**Part 1:**

For floor layout shown below. Each interior beam supports a uniform service dead load of 120 kN/m (including self-weight), and a uniform service live load of 120 kN/m. The solid slab thickness is 75 mm.

Prepare your work according to the following steps:

1. Draw a representative structural system for Beam B1 (indicated on the figure below) and develop the load cases to maximize the positive moment at the middle of first span as well as the negative moment at the interior support. Then Draw bending moment envelope for the beam.
2. Use the maximum negative moment to determine the required dimensions for the beam for a reinforcement ratio within the recommended range. the beam dropped width ( $b_w$ ) is limited to 250 mm. Use multiples of 5 cm for h.
3. If the beam dimensions are limited to ( $B=250\text{mm}$ ,  $H=650\text{mm}$ ). Select the reinforcement required for the positive and negative moments. Perform all necessary checks.
4. Present your design showing the location and the extension of each reinforcement using side views, sections and details as appropriate.

Use  $f_c' = 28 \text{ MPa}$ ,  $f_y = 420 \text{ MPa}$



**Part 2: (BONUS +50 Points)**

Calculate the moment Capacity of the Box section shown below. (Use  $f_c' = 28 \text{ MPa}$ ,  $f_y = 420 \text{ MPa}$ )

