

Menoufia University
Faculty of Engineering, Shebin El-Kom
Civil Engineering Department
Second Semester Examination, 2019-2020
Date of Exam: 19/8/2020



Subject : High Rise Buildings
المنشآت الخرسانية العالية
Code : CVE 613
Time Allowed : 3 hours
Total Marks : 100

Tables, Charts and Codes are Allowed
Any data not given can be reasonably assumed.

Question 1: [50 % of the Total Mark]

I- Explain with neat sketches whenever possible the following items:

- (a) Outrigger and Belt wall system.
- (b) Confined concrete.
- (c) soft stories.
- (d) Types of deformations.
- (e) Vertical setbacks.

[10%]

II – Explain with neat sketches the main common structural systems for resisting the lateral loads due to wind and earthquakes for tall buildings.

- If the height of the building is more than 60 stories, suggest three suitable systems for this building.

[10%]

III- The following sketches in Figure (1) represent sectional elevations of three not preferable cases of buildings for resisting seismic loads. Explain the previous statement and with neat sketches suggest how to improve each case.

[10%]

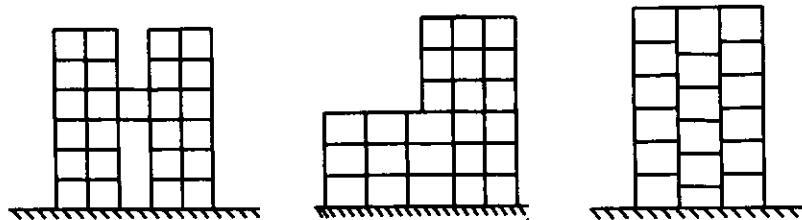


Figure (1)

IV- Why are the following plans in Figure (2) not recommended for high rise buildings? Explain how you can correct the systems to be executed.

[10%]

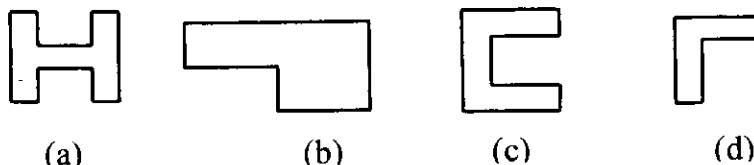


Figure (2)

V – How can engineers reduce the effect of the earthquakes on high-rise buildings by positive and negative control methods?

[10%]

Question 2: [50 % of the Total Mark]

Figure (3) shows a typical plan *abcd* of 14-story Office building. The dimension is 15 x 18 m. The height of each floor is 3m. The building is located in Cairo, and rested on a stiff clay. Assume the average total dead load is 1.0 t/m^2 and $LL=0.3 \text{ t/m}^2$. Thicknesses of all shear walls and the interior core are 0.3 m and connecting beams between coupled shear walls are $0.3 \times 0.7 \text{ m}$. $f_{cu}=300 \text{ kg/cm}^2$ and steel 36/52

It is required to:

- 1- Calculate the equivalent static lateral load on each floor due to the wind and earthquake in the shown direction only.
- 2- Calculate the base shear and the overturning moment and check the stability of the building due to earthquake only.
- 3- Calculate the center of mass and the center of rigidity of the building.
- 4- Calculate the shear, normal forces and moments due to earthquake for the coupled shear wall at axis A-A.
- 5- Make complete design* the connecting beam at axis A-A of the coupled shear wall at the seventh floor.

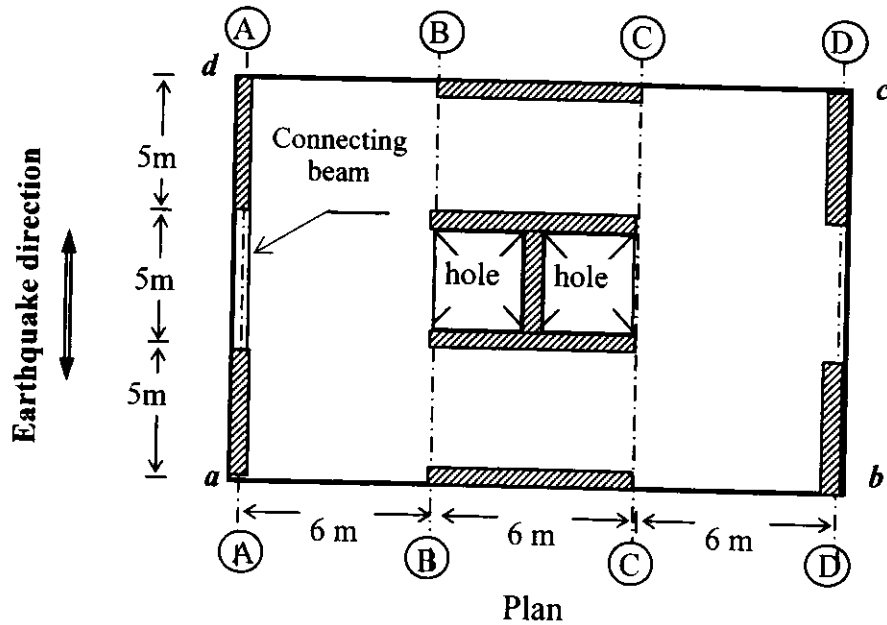


Figure (3)

- يسمح باستخدام كود الخرسانة وكود الأحمال وجداول ومنحنيات الخرسانة المسلحة
- يسمح باستخدام كتاب شاكر البحيري.

• Examiner: Prof. Nageh N. Meleka, Professor of Reinforced Concrete
(Best wishes)