دیری

Menoufia University Faculty of Engineering, Shebin El-Kom Civil Eng. Department Second Semester Examination, 2014-2015 Date of Exam: 30/ 5 / 2015		Subject: Reinforced Concrete Code: CVE 411 Year : 4rd Year Civil Time Allowed : 4 hours Total Marks : 100 marks

- **Any data not given is to be assumed**

Question 1 (5 %) :

Upon your study course on design of special concrete structures, state some engineering recommendations for fire save design for each of the following structures:

1- Reinforced concrete high rise buildings
2- Electrical power station
3- Nuclear power station
4- Food and beverage industrial factory

Question 2 (5 %) :

a- What are the factors affecting the fire resistance of reinforced concrete wall with 30 cm thickness subjected to fire with inner temp = 700 °c and outer temp = 30 °c? show your answer with free hand sketches

b- How can visual inspection be considered and effective tool for evaluate and inspect concrete structures subjected to fire or elevated temperature?

Question 3 (50 %) :

It is required to make complete design* of a rested water tank shown in Figure (1) with the shown configurations and dimensions. Use all around horizontal beam at top with depth = 90 cm and width of 30 cm and use a tie link beam if required. Assume the case where the two sections of the tank are full. Assume $f_{cu} = 250$ kg/cm², $f_y = 3600$ kg/cm².

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* Complete Design = Design + Drawing.

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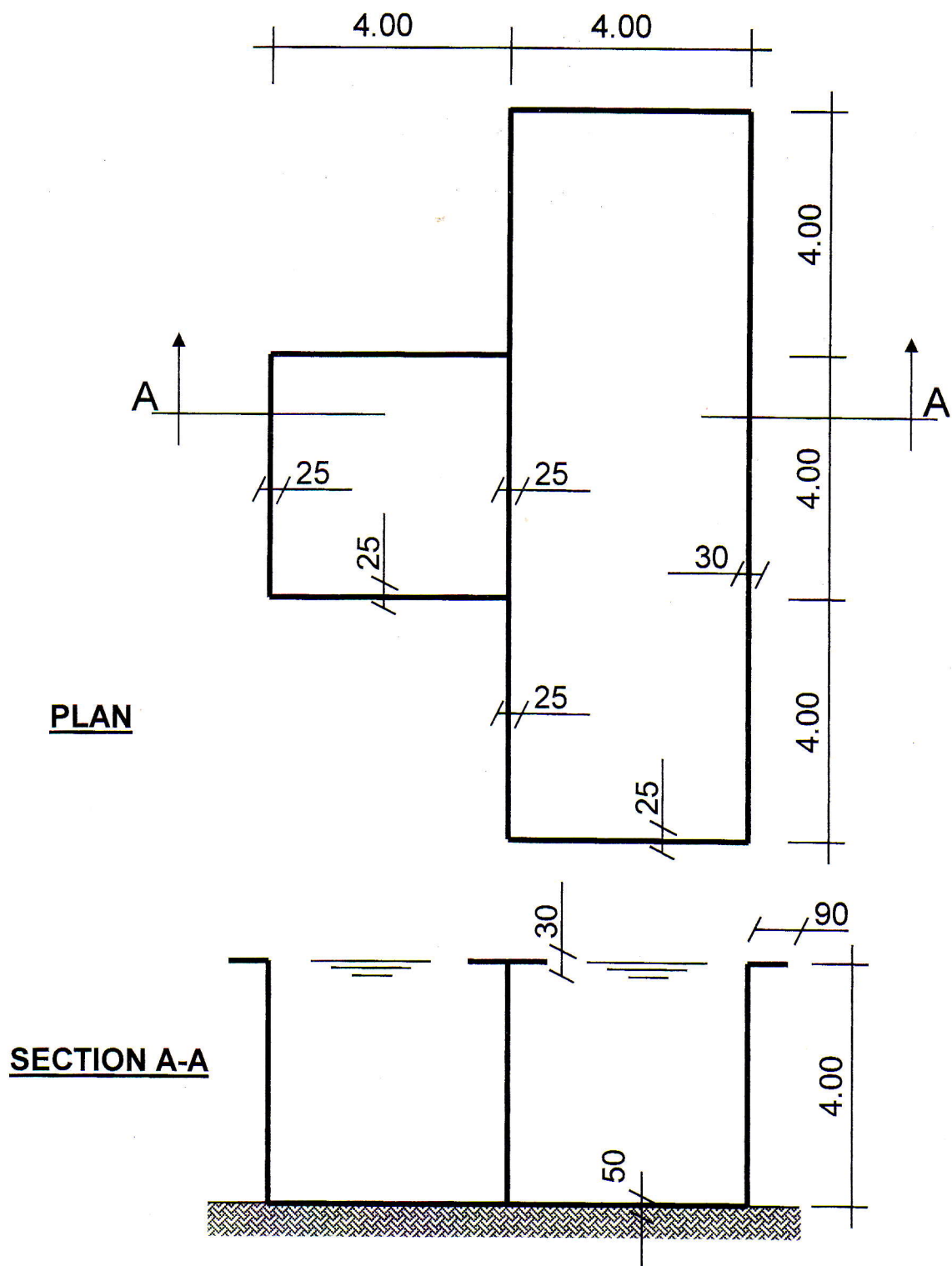- يسمح باستخدام كود الأحمال وكود الخرسانة المسلحة.

Figure 1

Question 4 (25%) :

Figure (2) shows a concrete slab shed with the shown
dimensions. It is supported on 3 interior double
cantilever frames only as shown. The ultimate uniform
load w_u=3 t/m^2 and two line loads q_u= 2 t/m'

(a) Draw the expected yield lines pattern.   (5%)

(b) Find the ultimate moments of the slab.   (15%)

(c) Design the slab and draw the details of reinforcement.

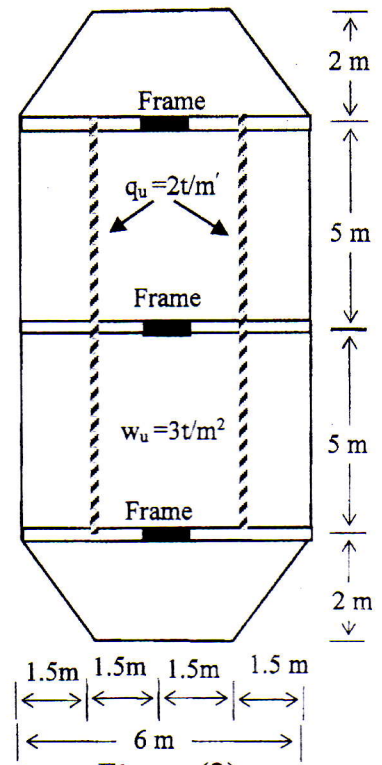   Assume f_{cu}= 300 kg/cm^2 , Steel 36/52   (5%)
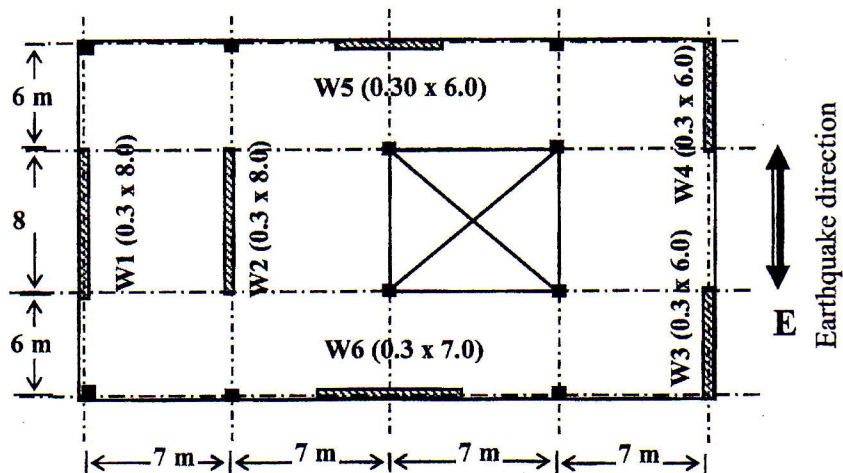

Figure (2)

Question 5 (25%)

Figure (3)

Figure (3) shows a plan of RC flat slab for a hospital 20x28 m. The building consists
of 6 stories and the floor height is equal 4 m. The building is in Cairo, and rested on
medium dense soil. The average total working dead load is 1.5 t/m^2, and live load is
0.5 t/m^2. Assume earthquake force in the shown direction and lateral loads are
resisted by shear walls only. According to the Egyptian Code 201 Calculate the
following items:

a- Calculate the max. base shear on the building and the equivalent lateral load on
   each floor due to earthquake in the shown direction   (10%)
b- Check overturning of the building, and the sliding if the adhesion strength
   C_a=5 t/m^2, and frictional angle between soil and foundation ϕ = 20 $^\circ$ (5%)
c- Calculate the center of mass CM and the center of rigidity CR
   and compute the design forces on walls w_1, w_2, w3,w4   (10%)