



Mansoura University 	Department: Structural Engineering Examiner: Prof. Dr. Ahmed Yousef Total Marks: 50 Marks	Faculty of Engineering 
Course Title: Reinforced Concrete (2) Date: January 2018	Course Code: NSTE10 Allowed Time: 3.0 hrs	Year: BCE300 No. of Pages: (2)

Notes: 1. Any missing data is to be reasonably assumed.
2. Design Aids can be used.

Question 1: (14 Points)

In Figure 1, the part of the roof between axis 4-4 and axis 7-7 is designed as a flat slab with marginal beams. It is required to design the external column strip and a middle strip in the vertical direction. Draw to scale 1:100 the details of reinforcement. The live load is 8.50 kN/m^2 and the flooring cover is 2.00 kN/m^2 . Use $f_{cu} = 30 \text{ N/mm}^2$ and steel 360/520.

Question 2: (10 Points)

In Figure 1, the part of the roof between axis 1-1, axis 2-2, axis C-C and axis D-D (including the cantilever), it is required to design a two way hollow-block slabs supported on hidden beams. Draw to scale 1:100 the concrete dimensions and the details of reinforcement of the slabs. Use the same data in question 1.

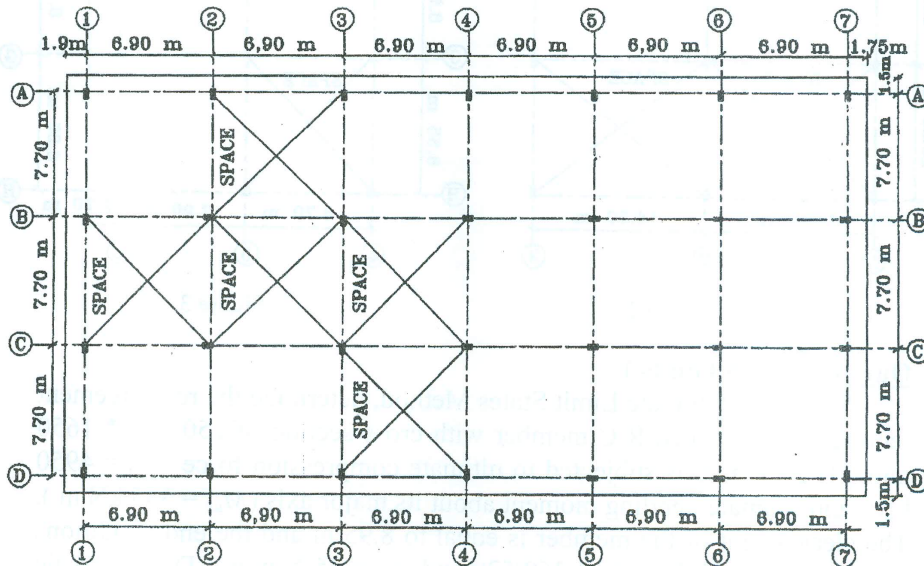


Figure 1

Question 3: (10 Points)

In Figure 2, the part of the roof between axis 1-1, 3-3, A-A and C-C is to be designed as a continuous paneled beams. Draw to scale 1:100 the layout and the concrete dimensions of the system. Design the least critical paneled beam in the horizontal direction. The live load is 6.50 kN/m^2 and the flooring cover is 1.50 kN/m^2 . Use steel 400/600 and $f_{cu} = 30 \text{ N/mm}^2$.

Question 4: (10 Points)

Arrange a reinforced concrete cantilever type stair in one of the spaces shown in Figure 3. The width of each flight is 2.30 m . The height of the story is 3.90 m . Design the stair and the stair beam and draw to scale 1:50 the details of reinforcement. Use $f_{cu} = 25 \text{ MPa}$ and steel 240/350. The live load is equal to 5.50 kN/m^2 .

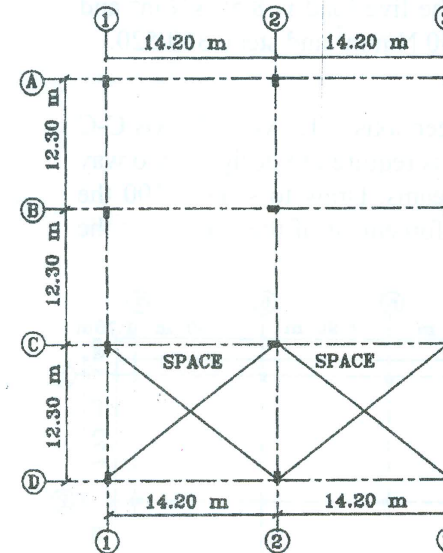


Figure 2

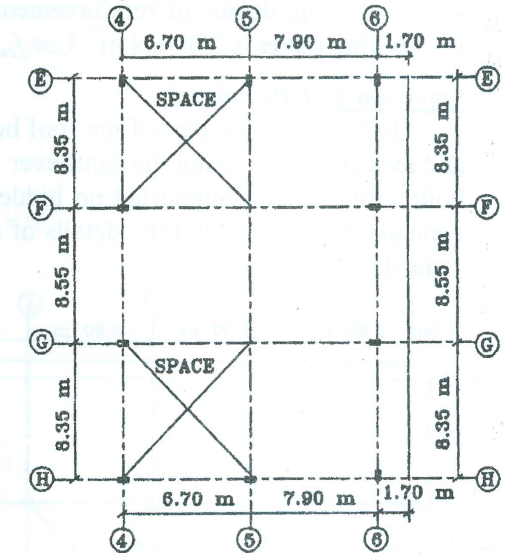


Figure 3

Question 5: (6 Points)

Using the Ultimate Limit States Method, determine the reinforcement required for unbraced R/C member with cross-section of $250 \text{ mm} \times 1650 \text{ mm}$. The member is subjected to ultimate compression force ($P_u = 4950 \text{ kN}$) and ultimate bending moment about its major axis ($M_{ux} = 585 \text{ kN.m}$). The clear height of the member is equal to 8.95 m and the end conditions are partially fixed. Use steel 360/520 and $f_{cu} = 35 \text{ N/mm}^2$. Draw to scale 1:10 the member cross-section showing the details of reinforcement.