The given plan in Fig. 1 shows the layout of a roof system. The design concrete characteristic strength is 30 MPa and the main steel used is 360/520. The live load is 6.80 kN/m² and the flooring cover is 2.0 kN/m². It is required to:

1- If the part of the roof between axis 3-3 and axis 6-6 is to be designed as flat slab with external marginal beams, it is required to design the column strip and a middle strip in the vertical direction. Draw to a suitable scale the details of reinforcement of the designed strips. (30%)

2- Design a two way hollow-block slabs for the part of the roof between axis 6-6 and axis 7-7 (including the cantilever) using Hagarit blocks. Draw to a suitable scale the details of reinforcement of the slabs. Design the beam on axis 7-7 and draw the details of reinforcement. (30%)

3- If the part of the roof between axis 1-1 and axis 2-2 is to be designed as continuous paneled beams, draw to a suitable scale the plan of the roof and design the most critical paneled beam. Draw the details of reinforcement of the designed beam. (30%)

4- Arrange a cantilever stair consisting of two flights in the spacing between axis 2-2 and axis 3-3. The width of the flight is 1.85 m. Design the stair and draw to suitable scale the details of reinforcement. (20%)

My best wishes,
Prof. Dr. Ahmed Yousef