REINFORCED CONCRETE DESIGN 1

Assessment 3

by
Dr. Sharifah Maszura Syed Mohsin
Faculty of Civil Engineering and Earth Resources
maszura@ump.edu.my

Question 1: Design of Staircase

Design and detail a typical two flights stair shown in Figure 1. The flights are spanning perpendicularly to each other sharing one common landing. The overall depth of the landing and waist of both flights are 150 mm, while the width of going and height of riser are 265 mm and 170 mm, respectively. Consider the variable load to be 3.5 kN/m^2 and permanent load from finishes, baluster and railing to be 1.0 kN/m^2. Use grade 25 concrete, grade 500 steel and nominal cover of the concrete is 25 mm.

Question 1: Design of Staircase (Figure 1)

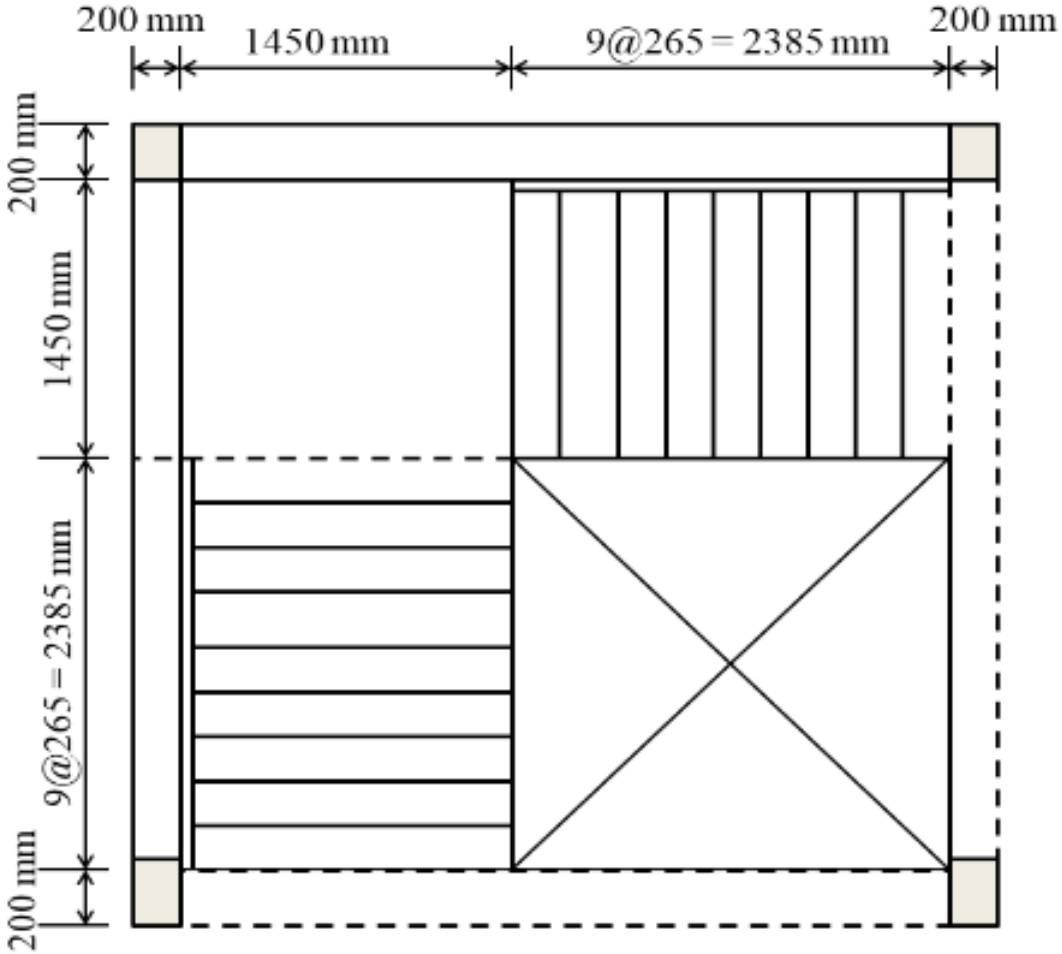


Figure 1

Question 1: Design of Staircase (Figure 1)

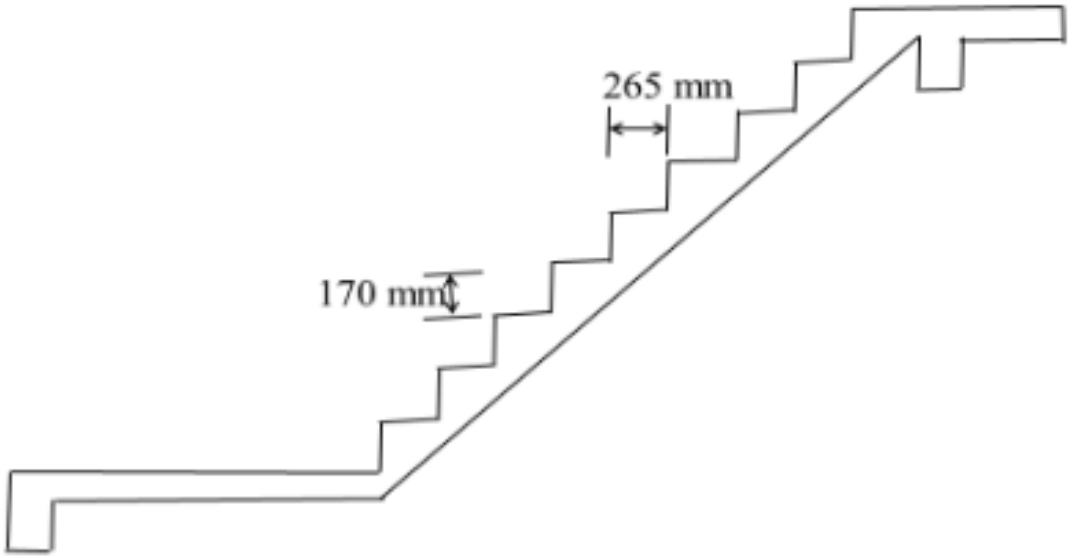
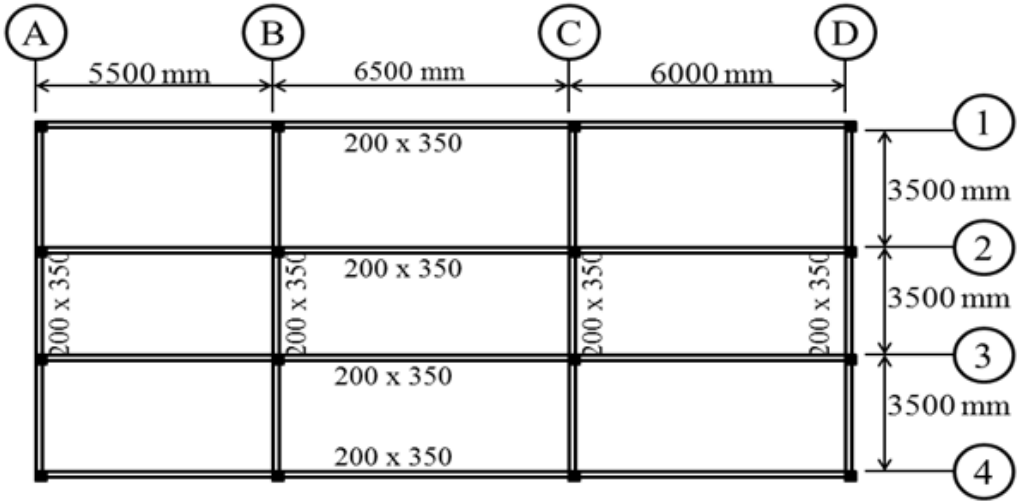


Figure 1 (continue)

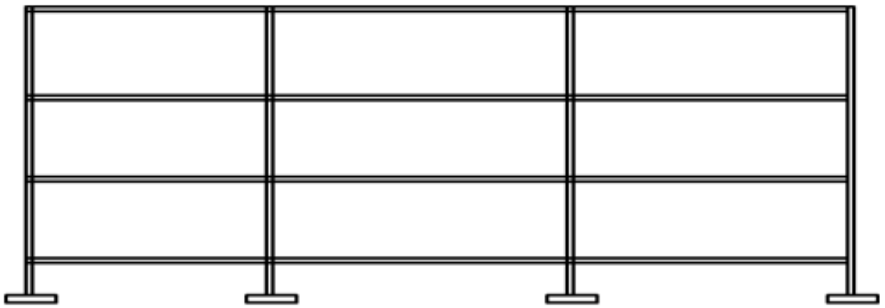
Question 2: Design of Column

Figure 2 shows a plan view and cross-section view of a three-storey reinforced concrete building. The building is considered braced with the provision of bracing elements at certain locations. The size of the column is designed to be 250 x 250 mm, whereas the size of the beam is taken as 200 x 350 mm. This column is subjected to ultimate axial load of 1300kN and ultimate bending moment of 35 kNm bent about minor axis. The clear height of each floor is 3.4 m. Calculate the slenderness of the column at D/3 on the 1st Floor and classify the column whether slender or non-slender (short). Use concrete characteristic strength, f_{ck} = 25 N/mm^2, steel characteristic strength, f_{yk} = 500 N/mm^2

Question 2: Design of Column (Figure 2)



Plan view



Cross-section

Question 3: Design of Column

Figure 3 shows a design for braced non-slender column for a building. This column is subjected to unfactored axial load of 350 kN and 600 kN for dead load and variable load, respectively. The ultimate bending moment of the moment bent about major axis is given in the **Figure 3.** Upon completion of the design phase, it was noticed that there was increased in the axial dead load of the column by 40%. Check the reinforcement provided for the column if the moment values acted on the column is unchanged as shown in the figure. Give comment and suggestion if appropriate.

Question 3: Design of Column (Figure 3)

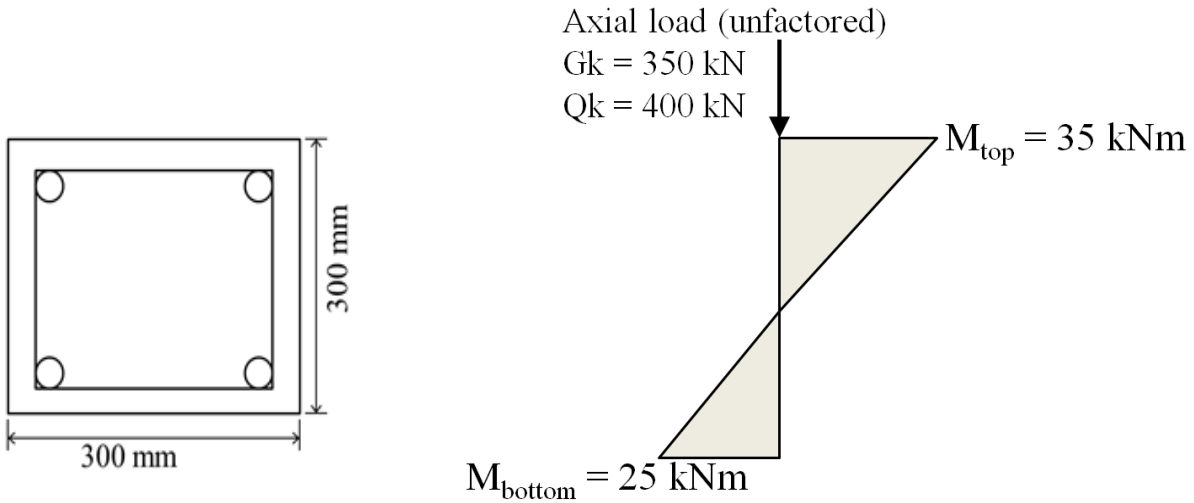


Figure 3

Question 3: Design of Column

The full specification of the column is given below:

- Concrete characteristic strength, f_{ck} = 25 N/mm^2
- Steel characteristic strength, f_{yk} = 500 N/mm^2
- Diameter of the main reinforcement, $\emptyset_{main}$ = 20 mm
- Diameter of the transverse reinforcement, $\emptyset_{link}$ = 6 mm
- Column size (b x h) = 300 x 300 mm
- Column effective height, l_o = 3400 mm
- Nominal concrete cover, c_{nom} = 30 mm
- Longitudinal reinforcement provided = 4H20
- Transverse reinforcement provided = H6 – 300 (H6 – 180 at lapped section)

End of Assessment