King Saud University
College of Engineering
Civil Engineering Department

CE462 - Analysis and Design of Building
1st Semester 1422 – 1423 H.
Time: 2:00 Hours

Mid Term Exam.

Question No. 1 (40%)

The maximum allowable live load that the floor shown in the Fig. below will safely support is to be investigated. A typical interior panel of the second floor is shown in the figure.

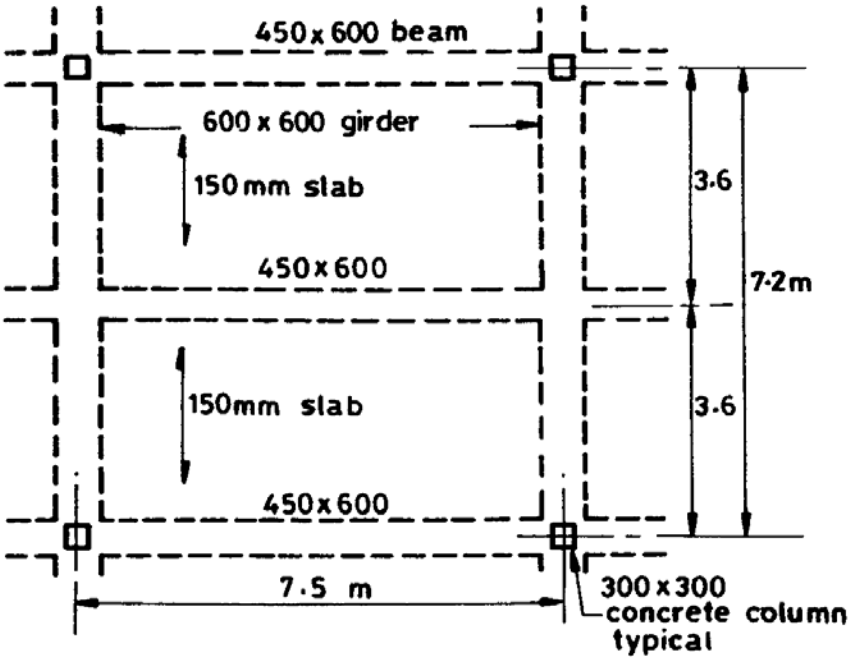
DESIGN CRITERIA

- f'_c = 25 MPa
- f_y = 420 Mpa
- Slab reinforcement with 20 mm clear cover
- ϕ 12 at 300 mm on center, bottom
- ϕ 12 at 200 mm on center, top at supports
- Superimposed dead load is 1.0 kN/m^2

REQUIRED

(a) What is the maximum unit live load that the second floor slab will support?

(b) List some other items that should be checked for which no information has been given.



Question No. 2 (60%)

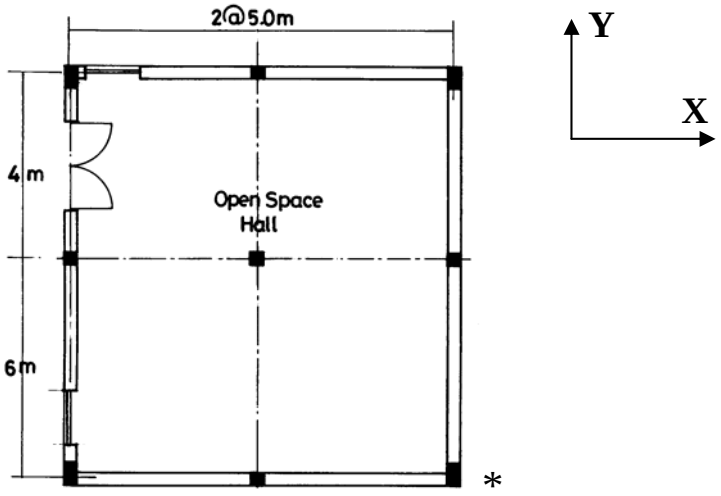
Shown below is the archetctural plan of one story open space Hall. The roof is to be designed as one-way joist slabs of the typical section given below.

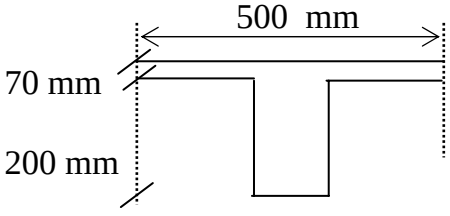
Assumptions:

All roof beams=300*700 mm, Corner columns=300*600 mm, edge columns= 300*300 mm, interior column 350*350 mm. Thickness of all walls is 300 mm with D.L=2.5 kN/m^2, Walls are supported on ground beam of 300*500 mm typical section, No walls on the roof beams, rooting D.L=2.5 kN/m^2, L. L=1.0 kN/m^2, Story height =3 m, Additional columns are not allowed. Additional beams must be supported on the existing columns.

Required

1. Suggest and draw a proper structural layout for the Hall floor consisting of one-way joist slabs supported on drops beams, provided that deflection requirements are satisfied for the given dimensions of the beams and slabs. Show and identify a proper grid of the layout.
2. Group the beams that can be assigned the same design strength and identify each beam-group.
3. Calculate the design surface load of the slabs.
4. Identify the beam-group that requiers the largest design flexural strength.
5. For the lower-right-corner (*) column, calculate the the design axial load and the aproximat moment about Y-axis.





150 m

Section of typical Rib