



Carleton
UNIVERSITY

**FINAL
EXAMINATION
December 2002**

DURATION: 3 HOURS

No. of Students:

Department Name & Course Number: **Civil Engineering CIVE 3204 (82.324)**
Course Instructor(s) **Professor J. L. Humar**

AUTHORIZED MEMORANDA

All books, notes and a calculator

Students **MUST** count the number of pages in this examination question paper before beginning to write, and report any discrepancy to a proctor. This question paper has **6** pages.

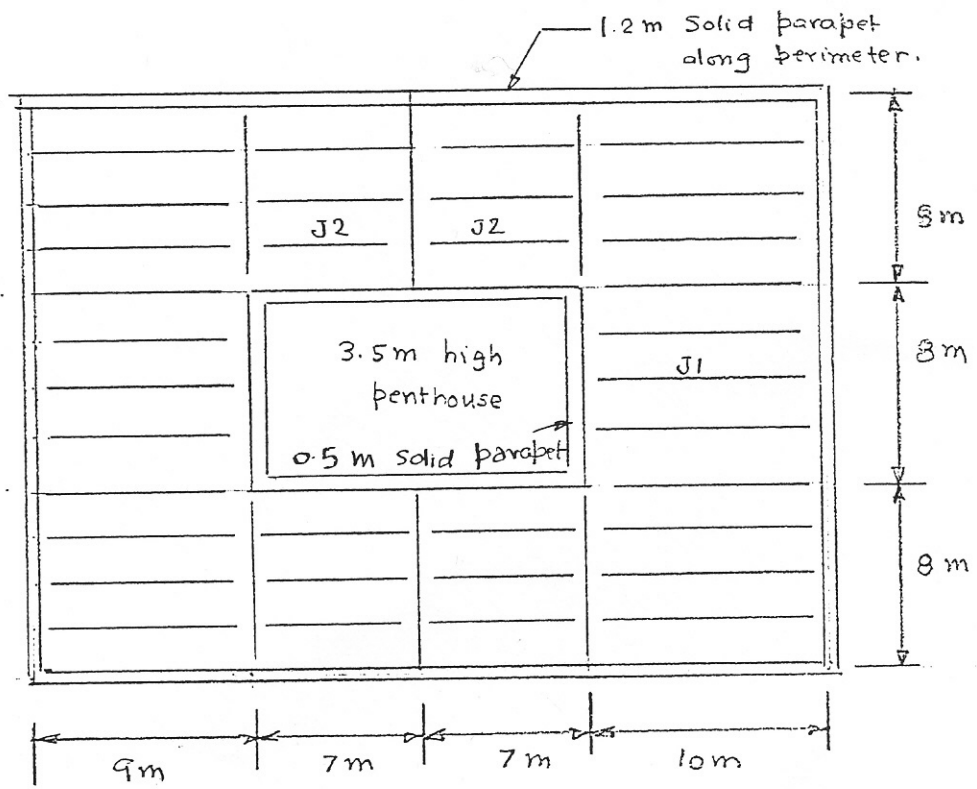
This examination question paper **MAY** be taken from the examination room.

In addition to this question paper, students require: an examination booklet yes no
a Scantron sheet yes no

Note: Attempt all questions. If a question appears incomplete, make appropriate assumptions and proceed. Clearly state your assumptions.

Question 1

The roof plan of a building in Ottawa is shown in the figure. Determine the snow load distribution on joists J1 and J2. What is the maximum factored shear produced by snow in each of these joists? The building is in a sheltered location.



Roof plan

Question 2

The steel framed office building shown in plan and elevation in the figure is located in Burnaby region of Vancouver, British Columbia. The building derives its stability against lateral forces by the action of ductile moment resisting frames in both N-S and E-W directions. The following specifications are used:

Roof

Five ply felt with gravel
110 mm rigid insulation
13 mm gypsum board
38 mm steel deck
plastered suspended ceiling

Floor

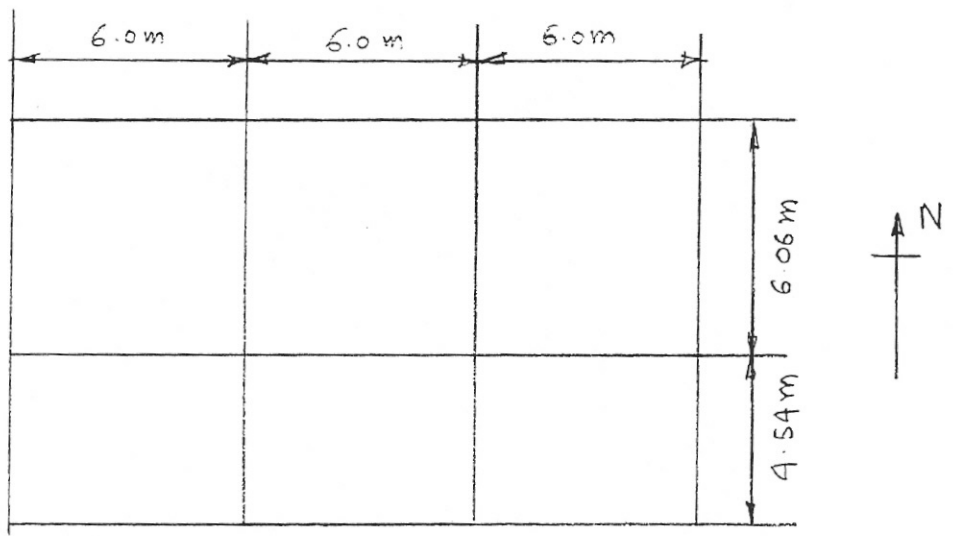
vinyl tile finish
65 mm normal weight concrete fill
over 38 mm steel deck
plastered suspended ceiling

For both the roof and the floor make suitable allowance per unit area for electrical and mechanical fixtures and the weight of structural members. You need not make any allowance for moveable partitions.

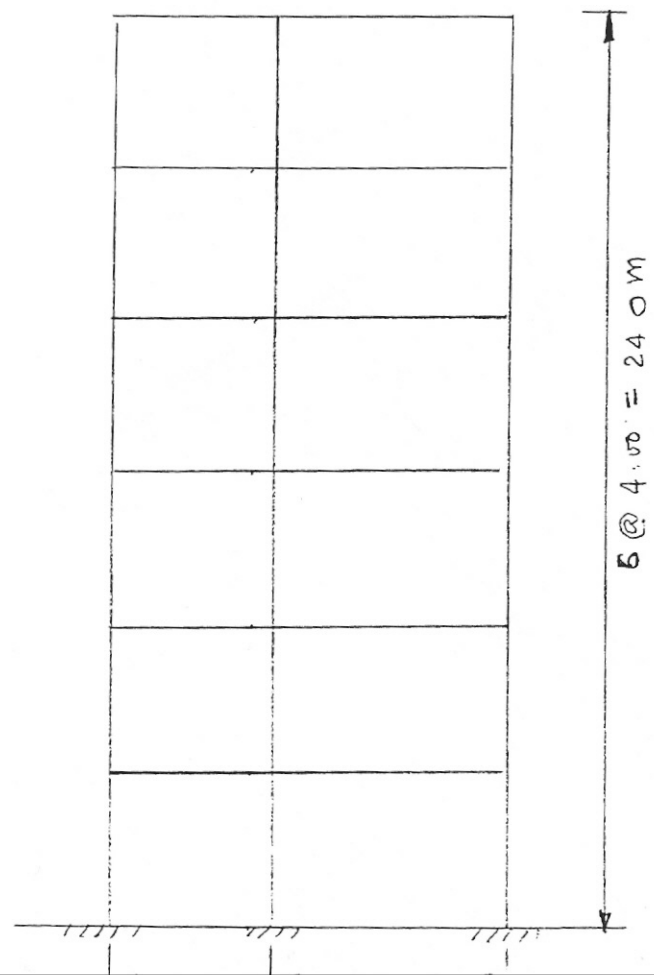
The external wall along the perimeter of the building consists of an outer skin of 110 mm thick clay brick and an inner skin of stud wall with 13 mm plaster board supported by furring channels. Half of the wall area is glazed. Ignore internal wind forces.

Calculate the lateral design wind forces in kN in the N-S direction at each floor on each of the windward and leeward sides. Ignore internal wind forces.

Also calculate the total design earthquake force at each floor in the N-S direction. Assume that the building is located in a sheltered location and there are no parapets on the roof.



PLAN

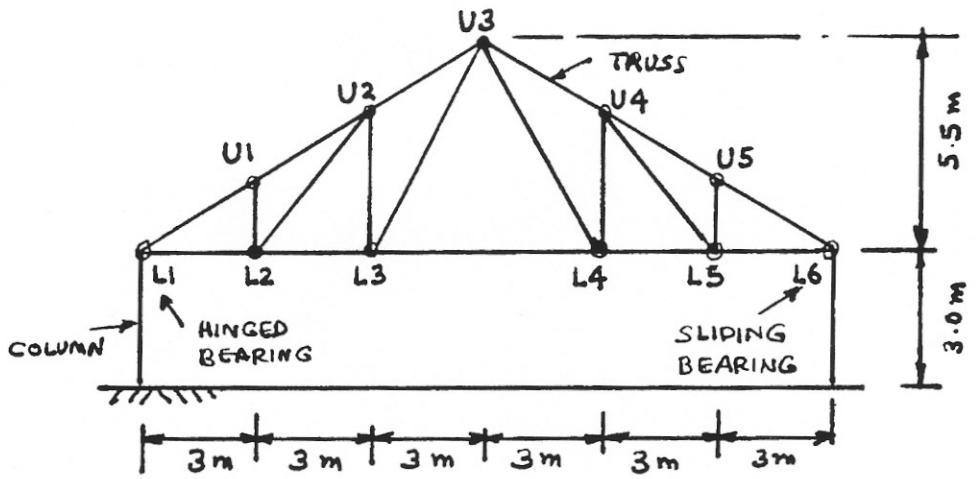


ELEVATION

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December 2002 Final Examination

Question 3

A small arena building located in Ottawa is shown in plan and elevation in the figure. The gable roof of the arena is supported by a Pratt truss as indicated. For truss T_1 determine the maximum unfactored design axial forces, compressive and tensile, in members U_5L_5 and U_5L_6 due to wind load. Ignore internal wind loads.



ELEVATION

