FACULTY OF APPLIED SCIENCES AND ENGINEERING
DEPARTMENT OF CIVIL ENGINEERING
UNIVERSITY OF TORONTO

CIV 313S - REINFORCED CONCRETE DESIGN
FINAL EXAMINATION
APRIL 19, 2001
Prof. J.F. Bonacci, Examiner

Notes:

1. The examination is open book and open notes.
2. Do not separate stapled sheets. Present all solutions on the pages given. No extra paper will be distributed. Print your name on every page.
3. *Solutions not presented in a clear, organized manner will be penalized up to 20%.*
4. Mark continuations of work onto new pages very clearly in order to receive credit.

QUESTION	TOTAL MARKS	MARKS ASSIGNED
1	20	
2	20	
3	10	
TOTAL	50	

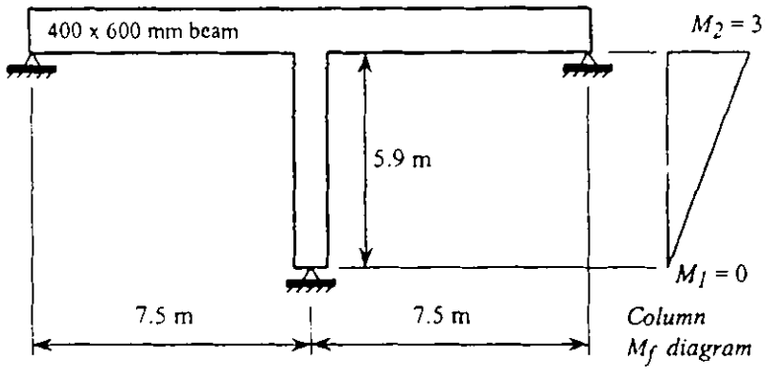
NAME: _____

STUDENT NUMBER: _____

NAME:_____

Question #1 (20 of 50 points)

The column in the braced frame must resist the factored bending moments M_f given in the diagram below. Under these conditions, how much factored axial compression resistance P_r does the column have?



f'_c = 30 MPa, normal density
f_y = 400 MPa
450 x 450 mm column
6 No. 30 bars longitudinal
(3 on two opposite faces of bending depth)
40 mm cover to No. 10 ties

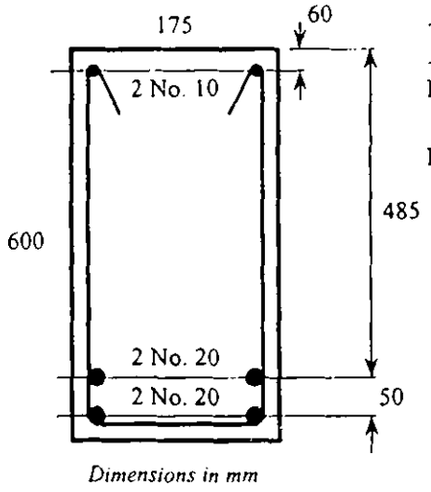
NAME: _____

Extra space

NAME: _____

Question 2 (20 of 50 points)

The beam section shown below will be used to support a uniformly distributed load of 80 kN/m (factored) acting downward over a simply supported span. Determine the maximum possible clear span for the given beam section. Summarize all results in a table next to the figure.



Dimensions in mm

f'_c = 20 MPa, normal density
f_y = 400 MPa
No. 10 stirrups @ 350
(1" @ 175, each end)
Exterior exposure

NAME: _____

Extra space

NAME: _____

Question 3 (10 of 50 points)

Provide short answers to the following questions. Emphasize the key aspects in your responses rather than writing extended essays with unnecessary information. Each question carries equal weight.

a. If a beam or slab does not meet the minimum depth requirements of Table 9-1 but does not support elements susceptible to deflection damage, how much deflection is permitted?

b. List one error discovered in the Concrete Design Handbook (can be either Part I or Part II).

c. Why is it not permitted to cut off 100% of the positive moment reinforcement within the span of a beam? List and explain one issue related to this detail.

d. Determine the modulus of elasticity for 45 MPa normal density concrete.

e. Code paragraph 11.2.8.1(b) says that minimum shear reinforcement requirements are waived for joists. Commentary N11.2.8.1 gives several reasons why this requirement is waived for various types of members. Which one most applies to joists?