

NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY  
DEPARTMENT OF CIVIL AND WATER ENGINEERING  
FACULTY OF INDUSTRIAL TECHNOLOGY  
BACHELOR OF ENGINEERING (HONOURS) DEGREE  
PART V FIRST SEMESTER EXAMINATION- JANUARY 2008  
DESIGN OF STRUCTURES II – TCW 5102

INSTRUCTIONS

Answer Question ONE and any two from Questions Two, Three and Four  
Open Book Examination

Time: 4hours  
Total Marks: 100

QUESTION ONE

( a ) Describe “DESIGN PROCESS” and the role of the Structural Designer in the process of design.

10 Marks

( b ) Define Structural Analysis and Structural Design

10 Marks

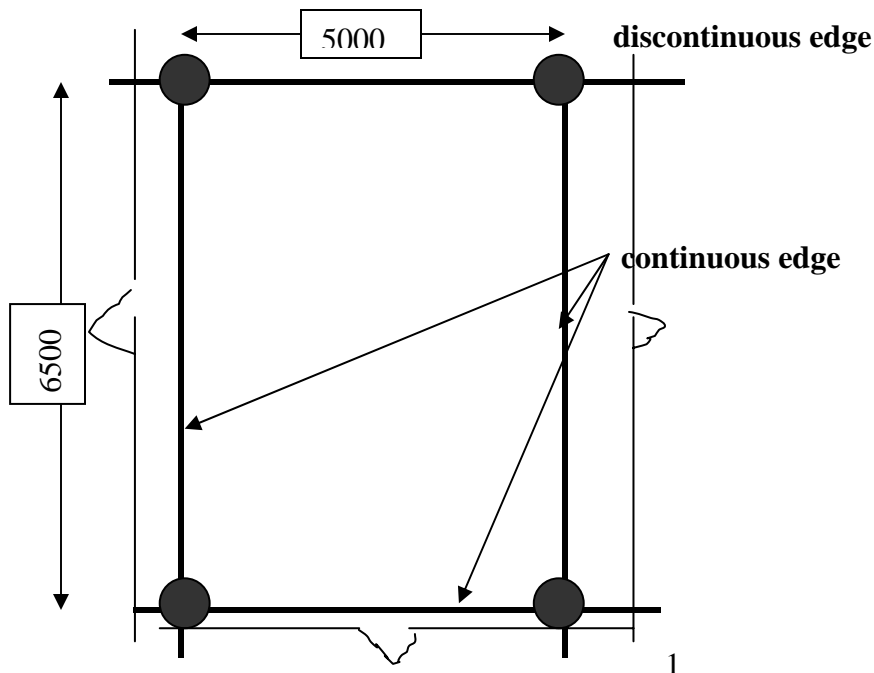
QUESTION TWO

The part floor plan for an office building is shown in the figure. It consists of restrained slabs poured monolithically with the beams. The slab is 175 mm thick and the loading is

Characteristic dead load (excluding self weight)       $2.0 \text{ kN/m}^2$

Characteristic imposed load       $2.5 \text{ kN/m}^2$

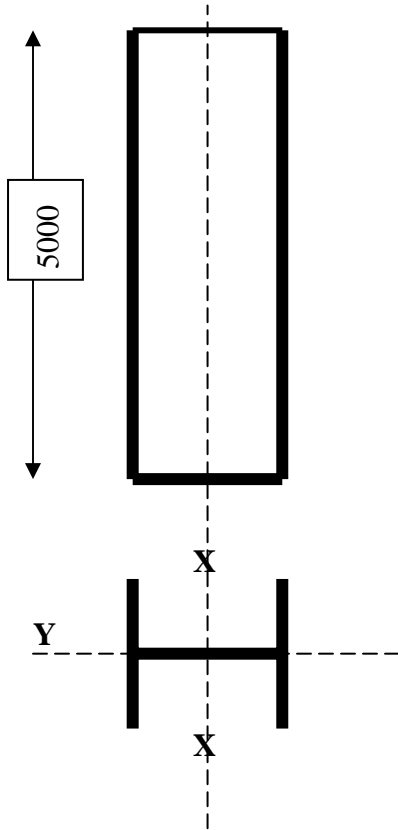
Design and detail the slab using Grade 30 concrete and Grade 460 reinforcement.



40 Marks

**QUESTION THREE**

( a ) Design a suitable grade 43 UC column to support an ultimate load of 1400 kN. The column is effectively held in position at both ends but not restrained in direction at both ends.



25 Marks

( b ) Design a suitable slab baseplate for the column section designed in ( a ) if the foundation is formed from grade 30 concrete.

15 Marks

**QUESTION FOUR**

A stud wall panel has an overall height of 3.75m including top and bottom rails and vertical studs at 600mm centers with nogging pieces at mid-height. Assuming that the studs, rail framing and nogging pieces comprise 44 x 100 mm section of strength class SC4, calculate the maximum uniformly distributed long-term total load the panel can support.

Assume the following modification factors :  $K_3$  (duration of load) = 1.0  
 $K_8$  (load sharing) = 1.1

40 Marks

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