NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY
DEPARTMENT OF CIVIL AND WATER ENGINEERING
FACULTY OF INDUSTRIAL TECHNOLOGY
BACHELOR OF ENGINEERING (HONOURS) DEGREE
PART V EXAMINATIONS (SUPPLEMENTARY) SEPTEMBER 2007
FOUNDATION ENGINEERING DESIGN TCW 5202

INSTRUCTIONS

Answer ALL QUESTIONS

OPEN BOOK EXAMINATION   **Time 3 hours.**
                                                                              Total Marks   100

QUESTION ONE
Describe briefly your understanding of Foundation Engineering and its relevance
in the design process of structural design.

Marks 15

QUESTION TWO

Design a rectangular base to support two columns supporting the following loads.
Column 1 : Characteristic dead load of 400 kN and
**   Characteristic live load of 200 kN**
Column 2 : Characteristic dead load of 500 kN and
**   Characteristic live load of 250 k**

The columns are 450mm square and are at 3.2 meter centres
Assume safe bearing pressure of the soil to be 250kN/mm^2.
Material properties are: Concrete Grade 30 and reinforcement Grade 460.
Assume cover to reinforcement to be 40mm .

Marks 40

QUESTION THREE

(A) Indicate the circumstances under which pile foundations are used

Marks 5

(B) Describe bearing piles and friction piles

Marks 5

(C) It is proposed to provide pile foundation for a heavy column load.
**   The pile group is square and consists of four piles of 500mm diameter**

at two meter centres. The piles are ten meter long.
The soil is clay having an undrained shear strength of $60kN/m^2$ at the
surface and $100kN/m^2$ at a depth of ten meters. Compute the
allowable column load on the pile cap. Assume cohesion factor for the clay
as 0.5. Factor of safety = 3.0

Marks 20

QUESTION FOUR

EXPLAIN THE FOLLOWING

(i) **Total overburden pressure**
(ii) **Total foundation pressure**
(iii) **Net foundation pressure**
(iv) **Ultimate bearing pressure**
(v) **Bearing capacity and Bearing pressure**

Marks 15

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