

NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY  
DEPARTMENT OF CIVIL AND WATER ENGINEERING  
FACULTY OF INDUSTRIAL TECHNOLOGY  
BACHELOR OF ENGINEERING (HONOURS) DEGREE  
PART V EXAMINATIONS MAY 2005  
FOUNDATION ENGINEERING DESIGN TCW 5202

**INSTRUCTIONS**

Answer ALL Questions

Time 3 Hours  
Total Marks:100

**QUESTION ONE**

**[A] 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

( 10 Marks)

**[B]**

An isolated 500mm dia. R.C.Pile is required to carry a maximum load of 500kN. It is sited on 7.5m of recently placed loose sand filling (  $N = 9$  blows per 0.3m and angle of shearing resistance  $= 30^\circ$  ), overlying 4.5m of soft clay ( shear strength  $c = 24\text{kN/m}^2$  ) followed by stiff clay ( shear strength  $c = 60\text{ kN/m}^2$  at 12.0m below ground level increasing to  $300\text{ kN/m}^2$  at 25.0m below ground level. Determine the required depth of penetration.

( 20 Marks)

**QUESTION TWO**

Consider a Pile group shown in Figure 1.0. A vertical load of 5000kN is applied at point G. Determine the maximum and minimum load in the pile group.

( 20 Marks )

### QUESTION THREE

[A]

A load of 500kN is uniformly distributed over a rectangular area of 1.5m by 1.0m. Determine the vertical stress component at a depth of 2.0m at the point marked G in the Figure 2.0

( 15 Marks)

[B]

A flexible foundation 3.0m square is to carry a uniformly distributed load of 2500kN and will be founded at a depth of 2.0m below the surface of a clay whose mean density is 18.5 kN/m<sup>3</sup>. The deformation modulus  $E$  is 20000 kN/m<sup>2</sup>.

The clay stratum rests at a depth of 8.0m below ground surface on a thick stratum of dense sandy gravel which may be taken as rigid. Poissons ratio = 0.5.

Figure 3.0

Determine the vertical displacement at

( a ) Corner of the foundation

( b ) At the centre of the foundation.

( 15 Marks)

### Question Four

[A] Define Geotechnical Process.

( 1 Mark )

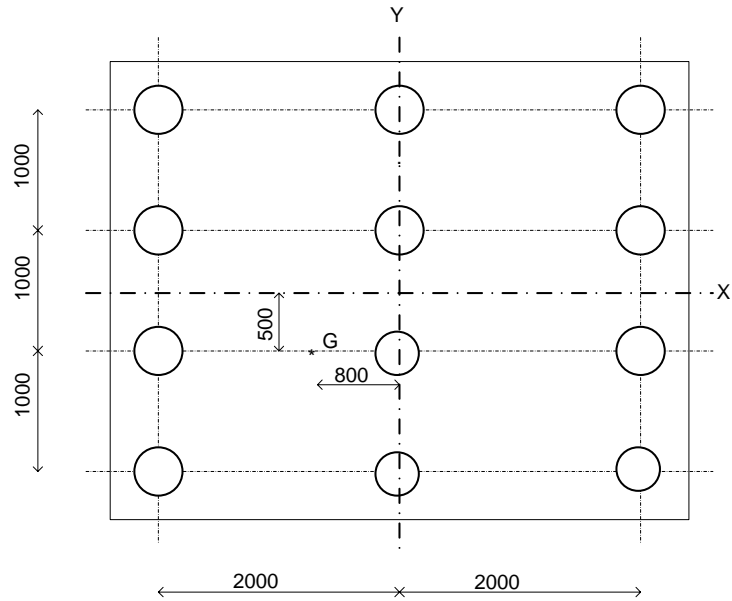
[B] Name three methods available in Geotechnical Processes.

( 3 Marks )

[C] Briefly describe any two methods.

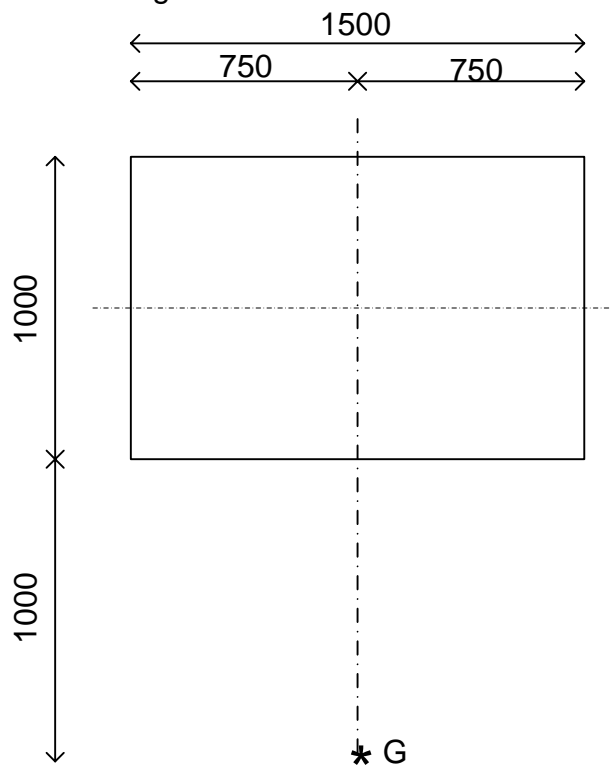
( 16 Marks )

QUESTION TWO  
Figure 1.0



QUESTION THREE

Figure 2.0



### QUESTION THREE

Figure 3.0 [B]

