ET-501(B)

00632

B.Tech. Civil (Construction Management) /
B.Tech. Civil (Water Resources Engineering)
Term-End Examination
June, 2013
ET-501(B) : FOUNDATION ENGINEERING

*Time : 3 hours*   *Maximum Marks : 70*

Note : *Attempt any five questions. All questions carry equal marks. Assume missing data if not given.*

1. (a) Discuss sample requirements and distortions in sampling including recovery ratios.   7

    (b) Explain Standard Penetration Test.   7

2. (a) Write brief note on the factors affecting bearing capacity.   7

    (b) Determine the ultimate bearing capacity using Terzaghis' bearing capacity equation. A strip footing of width 3.0 m is to be founded at a depth of 2.0 m in a well - drained sand stratum having the following properties : $\phi' = 40°$, $c = 0$ $\gamma = 20$ kN/m^3 $N_c = 95.9$ $N_q = 81.3$ $N_\gamma = 100.4$.   7

3. (a) Describe various types of footings with neat sketches.   7

(b) Design a rectangular reinforced concrete   7
footing for the following design data :

Loads : Dead Load = 340 kN ; Live
Load = 260 kN, Column size = 400×400
mm, Column reinforcement is four 20 mm
bars. M20 grade concrete and Fe415 steel.
Allowable bearing capacity = 100 kPa.
Assume B = 2 m.

4. (a) Explain effect of footing size on stress zone   7
with sketches.

(b) A mat foundation of 15 m × 15 m and   7
weighing 20 kN/m² is to be constructed on
the surface of a soil strata. The number of
squares enclosed in the plan of the mat in
Newmarks' diagram is 90. Calculate the
settlement at the centre of the mat.
Influence area of each square is 0.005. The
profile is as follows :
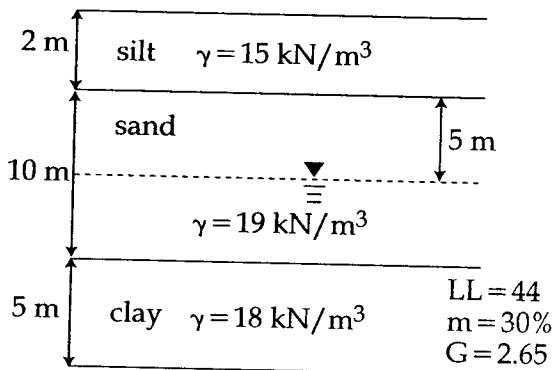
5. (a) Describe types of earth retaining structures. 7

   (b) A 5 m high retaining wall is shown in the 7
   following figure. Determine the Rankine
   active pressure on the wall.

   (i) Before the formation of the crack.

   (ii) After the formation of the crack.

$\phi = 30°$

$c = 5 \, kN/m^2$

$\gamma = 17.5 \, kN/m^3$

5 m
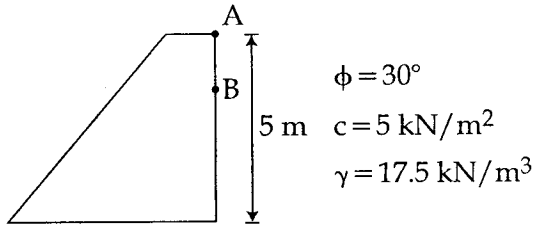
6. (a) Describe various types of pile foundations. 7

   (b) Discuss the factors affecting dynamic 7
   modulus.

7. (a) A six pile cluster with 40 cm diameter piles 7
   with centre to centre spacing of 105 cm
   shown in figure is driven into a deep deposit
   of clay. The unconfined compressive
   strength is 90 kN per sq.m. The length of
   pile is 21 m. Calculate the carrying capacity.

├─105 cm─┼─105 cm─┤

105 cm

145 cm

├───── 250 cm ─────┤

145 cm

2100 cm   ├─ 250 cm ─→
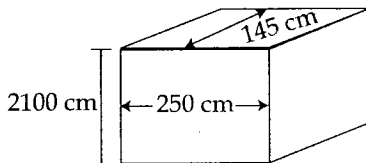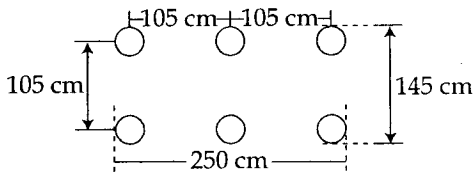
(b) Calculate the final settlement of the clay   7
layer shown in the figure due to an increase
in pressure of 30 kN/m^2 at mid - height of
the clay layer. Take $\gamma_\omega = 10$ kN/m^3.
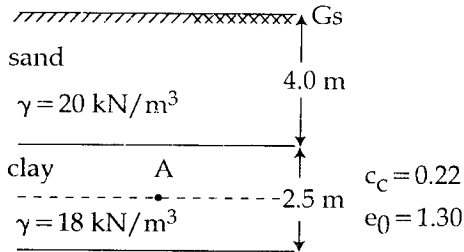
Also calculate the settlement when the water
table rises to the ground surface.

8.   Write short notes on the following : $4 \times 3\frac{1}{2} = 14$

(a)   Methods of sub - surface exploration

(b)   Factors affecting bearing capacity

(c)   Settlement of layered soils

(d)   Well foundation - Design