(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID :100651 Roll No. | | | | | | | | | | |

B.Tech.

(SEM. VI) THEORY EXAMINATION 2013-14

ADVANCED FOUNDATION DESIGN

Time : 2 Hours *Total Marks : 50*

Note :–Attempt **all** questions

1. Attempt any **four** parts of the following : **(3.5×4=14)**

(a) Discuss the equivalent point load method based on approximate stress distribution.

(b) State Boussinesq's equation for determining the vertical pressure under a superimposed load. Discuss the limitations of the equation.

(c) Explain how will you modify the Newmark's equation based on Boussinesq's analysis for vertrical pressure below a corner of uniformly loaded rectangular area when the point at which vertical pressure is required is not located below a corner but below some other point of the rectangle.

(d) Determine the vertical stress at a point P which is located 3 m below and at a radial distance of 3 m from the vertical load of 100 kN. use Westergaard's solution. ($\nu = 0.0$)

(e) A concentrated load of 40 kN acts on the surface of a soil. Determine the vertical stress increment at points directly beneath the load upto a depth of 5 m.

(f) A water tower is supported only on three pillars forming an equilateral triangle with 10 m side. The total weight of the tower is 120 tonnes. Calculate vertical stress 10 m below the ground level under any one of the legs.

2. Attempt any **two** parts of the following : **(6×2=12)**

(a) A foundation in sand will be 5 metres wide and 1.5 metres deep. Adopting a factor of safety of 2.5, what will be safe bearing capacity if the unit weight of the sand is 1.9 gm/ c.c. and angle of internal friction is 35°. How does it compare with safe bearing capacity for surface loading. $N_C = 57$, $N_q = 44$, $N_y = 42$.

(b) Determine the ultimate bearing capacity of the footing, 1.5 m wide and its base at a depth of 1 m, if the ground water table is located :

(i) at a depth of 0.5 m below the ground surface.

(ii) at a depth of 0.5 m below the base of the footing.

$Y_{sat} = 20$ kN/ m^3.

$Y_d = 17$ kN/ m^3 ,$\phi = 38°$ & $c = 0$ use Terzaghi's theory. $N_q = 60$ & $N_y = 75$.

(c) Explain in detail, the effects of size of footing on both the ultimate bearing capacity & the settlement.

3. Attempt any **two** parts of the following : **(6×2=12)**

(a) What are the factors governing load carrying capacity of pile ? What is the objective of pile load test ? Write steps to determine safe load from pile load test.

(b) What is negative skin friction ? What is its effect on the pile ? A 30 cm. diameter concrete pile is driven in a normally consolidated clay deposite 15 m thick. Estimate the safe load. Take Cu = 70kN/ m^2, $\alpha = 0.9$ and F.S. = 2.5

(c) Discuss the components of well foundation and draw the neat sketch of a well foundation. Explain all the terms in brief.

4. Attempt any **two** parts of the following : **(6×2=12)**

(a) Derive an expression for the factor of safety of an infinite slope in a cohesionless soil. What is the effect of steady seepage parallel to the slope on the stability ?

(b) A 10 m high cutting has a slope of 40° to horizontal, the soil was tested and its cohesion, void ratio & angle ϕ were found to be 2.5 t/ m^2, 0.81 and 14° respectively. Determine the FOS with respect to cohesion against failure of the slope. When water level rises upto the full height :

Given : G = 2.7 & for 40° slope values of stability number for different values of ϕ

ϕ	N
6°	0.122
7°	0.116
14°	0.074

(c) What are the design criteria for foundations of reciprocating machines based on IS : 2874 (I) - 1982 ? Discuss criteria for the design of foundation in case of free vibration without damping.