

FACULTY OF ENGINEERING

B.E. 4/4 (Civil) I – Semester (New) (Main) Examination, November 2013

Subject: Foundation Engineering

Time: 3 Hours

Max.Marks: 75

*Note: Answer all questions from Part A. Answer any five questions from Part B.***PART – A (25 Marks)**

1. Sketch the typical distribution of vertical stress (σ_z) on a vertical plane radially 'r' distance from the Point Load, Q and mention the salient features on it.
2. The increment in vertical stress (σ_z) directly beneath a point load was found to be 4775 kPa. Compute (σ_z) under the same load at a point (2,2,1).
3. A concentrated load of 500 kN is acting on the ground surface. Determine the depth to which the pressure bulbs corresponding to 100 kPa and 300 kPa will extend.
4. Sketch the contact pressure distribution diagrams for a Rigid, Flexible footing laid on a cohesive soil. State the basic difference.
5. Differentiate "Shallow foundations" with "Deep foundations"
6. Give classification of piles based on method of installation
7. What is an "Under-reamed pile foundation"? Comment on its suitability.
8. The load carrying capacity of an end bearing pile of 300 mm dia is estimated as 200 kN. How the capacity can be doubled for the same length?
9. The load carrying capacity of a single friction pile is estimated as 300 kN. All parameters being same, determine the capacity if its length is halved and its diameter is doubled.
10. Sketch a typical timber braced cut and name the parts.

PART – B (50 Marks)

- 11.(a) A OHSR is provided with a ring type foundation with OD=10m and ID=6m. Compute (σ_z) at a depth of 1.50m below center of the ring foundation, if it transmit a udl of 3000 kPa. (5)
- (b) Compare Boussinesque's theory with Westergaard's theory and comment on the validity of these elastic theories in estimation of (σ_z). (5)
- 12.(a) Explain the failure mechanism of shallow foundations. (3)
- (b) Determine total settlement of the foundation, for the conditions given below: (7)

Ground level

(+) 0.00m

SAND with $\gamma = 19.50$ kN/cum

2m wide square footing transmitting a contact pressure of 150 kPa

Foundation level

(-) 2.00 m

FULLY SATURATED COMPRESSIBLE CLAY $\gamma_{SAT} = 21.50$ KN/cum, LL=80%, $e_0=1.10$, $\mu=0.28$, $E_s=21000$ kPa

lw=1.05

(-) 5.00 m

SAND

Use 2V : 1H distribution

- 13.(a) Explain the procedure of plate load test including its limitations. (5)
- (b) A 400 mm wide square RCC pile is driven in to a sandy strata to a depth of 9 m. The average properties of the sand include $\phi=40^\circ$, $N_q=109.41$, $K=1.5$, $\delta=2/3(\phi)$. The ground water table is at a depth of 2 m below the ground level. The unit weigh of soil above and below the GTW are found to be 17.60 kN/cum and 19.80 kN/cum respectively. The critical depth factor is found to be 15. Determine the ultimate load carrying capacity. (5)
- 14.(a) Write a note on “Dynamic formulae” and comment on their validity. (5)
- (b) A group of 15 piles, arranged in 3x5 pattern are provided in a clay deposit to a depth of 9 m. The size of each pile is 300mm dia provided at a c/c spacing of 0.80m, the average properties of the clay are $c_u=60$ kPa, adhesion factor=0.68. Determine the safe load carrying capacity of the pile group. Adopt FS=2.50. (5)
- 15.(a) Compare “Open caissons” with “Pneumatic Caissons” including their merits, demerits and suitability. (5)
- (b) Explain various types of cofferdams and the conditions in which each of them is ideal. (5)
- 16.(a) Write a detailed note on “Timbered excavations”. (5)
- (b) Describe various methods of collection of undisturbed soil samples (UDS). Explain the procedure for determination of quality of a UDS. (5)
17. Write a note on any **two** of the following:
- Newmark’s influence diagram
 - Standard Penetration Test
 - Cyclic pile load test – procedure and its use
 - De-watering methods.
