

# Apollo Institute of Engineering and Technology

## Assignment/Question Bank

Branch: CIVIL

Subject: Foundation Engineering

### ASSIGNMENT-1

#### Selection of Foundation & Sub Soil

##### Exploration/Investigation

- 1) Difference between shallow and deep foundation.
- 2) Factors considered in selection of types of foundation.
- 3) Steps in choosing types of foundation.
- 4) Objective and planning of exploration.
- 5) Types of soil samples and samplers.
- 6) Different field test SPT, SCPT, DCPT.
- 7) Bore Log and Report Writing.

### ASSIGNMENT-2

#### Shallow Foundation

- 1) Explain in details modes of shear failures.
- 2) Explain in details SPT, SCPT, and PLATE LOAD test.
- 3) Discuss the various factors that affect the bearing capacity of a shallow footing. Write brief critical notes on settlement of foundations. How do you ascertain whether a foundation soil is likely to fail in local shear or general shear?
- 4) Compute the allowable bearing capacity of a square footing of 2m size resting on dense sand of unit weight  $20 \text{ kN/m}^3$ . The depth of foundation is 1 m & the site is subject to flooding. The bearing capacity factors are:  $N_c = 55$ ,  $N_q = 38$ ,  $N_\gamma = 45$ .
- 5) Determine the size of the square footing at the ground level to transmit a load of 900 kN in sand having unit weight  $18 \text{ kN/m}^3$  ( $N_q = 43$ ,  $N_\gamma = 46$ ). Factor of safety is 3. What is the modification in the result, if the footing may be placed at a depth of 1 m below the ground surface? The site is subject to flooding.
- 6) A square footing  $2\text{m} \times 2\text{m}$  carries a uniformly distributed load of  $314 \text{ kN/m}^2$ . Find the intensity of vertical pressure at a depth of 6m below a point 0.5m inside each of the two adjacent sides of footing.
- 7) A square footing  $2.5\text{m} \times 2.5\text{m}$  is built on a homogeneous bed of sand of density  $19 \text{ kN/m}^3$  having an angle of shearing resistance of  $36^\circ$ . The depth of foundation is 1.5m below the

ground surface. Calculate the safe load that can be applied on the footing with a factor of safety is 3. Take bearing capacity factors as  $N_c = 27$ ,  $N_q = 30$ ,  $N_\gamma = 35$ .

### ASSIGNMENT-3

#### Pile Foundation

- 1) Explain pile load test in brief.
- 2) Classify pile based on their function
- 3) Explain the effect of negative skin friction on to the load carrying capacity of the pile.
- 4) A  $5 \times 5$  square pile group made of concrete of length 20m is embedded in cohesive soil ( $C_u = 50\text{kPa}$ ,  $t = 16 \text{ kN/m}^3$ ). Calculate the ultimate load carrying capacity of the pile group if each pile has diameter of 0.5m. Take  $\alpha = 0.7$ .
- 5) With a schematic diagram, describe Hiley's formula for calculating the ultimate load carrying capacity. What are its limitations? Giving suitable sketch, describe Pile Load Test and the method of finding the allowable load carrying capacity.
- 6) In a 16 pile group, the pile diameter is 0.4m and c/c spacing of piles in the square group is 1.5m. If  $C_u = 50 \text{ kN/m}^2$ , determine whether the failure would occur as block failure or when the piles act individually. Neglect bearing at the tip of the pile. All piles are 12m long. Take  $\alpha = 0.7$  for shear mobilization around each pile. Also determine the safe load on this group.
- 7) A square pile group of 16 piles penetrates through a filled up soil of 3m depth, the pile diameter is 250 mm and pile spacing is 750 mm. The unit cohesion of the material is  $180 \text{ kN/m}^2$  and unit weight of soil is  $15 \text{ kN/m}^3$ . Draw plan section elevation of the pile group and compute negative skin friction of the group.
- 8) A drop hammer weight of 50kN and having an effective fall of 0.75m drives an RCC pile weighing 35kN. The average settlement per blow is 1.4cm. The total temporary elastic compression is 1.8cm. Assuming coefficient of restitution as 0.25 and factor of safety 2.5, determine ultimate bearing capacity and allowable load on pile.

### ASSIGNMENT-4

#### Retaining Wall

- 1) Described each Types of retaining wall (Types of flexible and rigid earth retention systems: counter fort, gravity, diaphragm walls, sheet pile walls, soldier piles and lagging).

### ASSIGNMENT-5

#### Foundation on Problematic Soil & Introduction to Geosynthetics

- 1) Describe Characteristics of expansive soil & problems and preventive measurement.
- 2) Explain in details Concept of Under rammed pile foundation.
- 3) Explain types of geosynthetics and its use.