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ET-501(B)

B.Tech. Civil (Construction Management) / B.Tech. Civil (Water Resources Engineering)

Term-End Examination

00090

December, 2014

ET-501(B) : FOUNDATION ENGINEERING

Time : 3 hours *Maximum Marks : 70*

Note : *Attempt any **five** questions. Assume any required data if missing.*

1. (a) Briefly explain the various methods of soil exploration. 7

(b) What are the assumptions of Terzaghi's theory for the determination of bearing capacity of shallow foundations ? Explain with a neat sketch. 7

2. (a) What is a bore hole ? Show the geophysical profile of a soil with a neat sketch. 7

(b) A strip footing 1·0 m wide at its base is located at a depth of 0·8 m below the ground level. The properties of soil are $\gamma = 18\ kN/m^3$, $c = 30\ kN/m^2$ and $\phi = 20°$. Determine the safe bearing capacity of soil using a factor of safety of 3. 7

The bearing capacity factors are the following : $N_c' = 11{\cdot}80$, $N_q' = 3{\cdot}90$ and $N_\gamma' = 1{\cdot}70$.

3. (a) Define the following terms : 7

(i) Ultimate bearing capacity of soil

(ii) Safe bearing capacity of soil

(iii) Net bearing capacity of soil

(iv) Allowable bearing capacity of soil

(b) Explain why cohesionless soils are preferred as backfill for retaining walls. 7

4. (a) Differentiate between a shallow foundation and a deep foundation. 7

(b) Determine the depth at which a circular footing of 2 m diameter be founded to provide a factor of safety of 3, if it has to carry a safe load of 1600 kN. The soil has $c = 10\ kN/m^2$, $\phi = 30°$ and $\gamma = 18\ kN/m^3$. For $\phi = 30°$ take $N_c = 37{\cdot}2$, $N_q = 22{\cdot}5$ and $N_\gamma = 19{\cdot}70$. 7

5. (a) Enlist different types of samplers and describe any one of them with a neat sketch. 7

(b) The thickness of a normally consolidated soft clay layer is 6 m. The natural water content of the soil is 30%. The specific gravity of soil is 2·68 with a liquid limit of 41%. The saturated unit weight of clay is $17{\cdot}5\ kN/m^3$. The water table is at the surface of clay. Determine the settlement of the foundation if the centre of clay layer is subjected to increase of vertical stress of $8\ kN/m^2$. 7

6. (a) Explain the various causes of failure of earth retaining structures. 7

(b) Write the utility of an under-reamed pile foundation. Discuss how bulbs of such a foundation function. 7

7. (a) Under what conditions would you recommend a well foundation to be constructed ? Draw a neat sketch of such a foundation. 7

(b) Give a classification of piles based on material. 7

8. (a) What are pile load tests ? Discuss briefly. 7

(b) Discuss the effect of footing size on stress zone below a foundation. 7

9. Write short notes on any ***two*** of the following topics : *2×7=14*

(a) Differential Settlements

(b) Culmann's Procedure

(c) Combined Footings