B.Tech. CIVIL ENGINEERING (BTCLEVI)

Term-End Examination

December, 2016

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BICE-012 : GEOTECHNICAL ENGINEERING – II
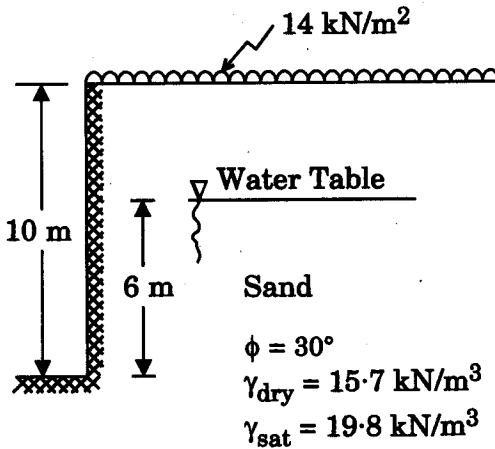
Time : 3 hours   *Maximum Marks : 70*

Note : Attempt any five questions. All questions carry equal marks. Use of scientific calculator is allowed. Assume suitable data, if required.

1. (a) Write the assumptions made in Rankine theory for active earth pressure. Derive the expression for determination of active earth pressure on backfill with cohesionless soil having no surcharge.   7

   (b) Explain any two methods of improvement of bearing capacity of soil.   7

2. For an earth retaining structure shown in the figure below, construct the earth pressure distribution diagram for active state and determine the total active thrust on the wall per metre length and its point of application.   *14*

14 kN/m^2

Water Table

10 m

6 m   Sand

$\phi = 30°$
$\gamma_{dry} = 15 \cdot 7 \text{ kN/m}^3$
$\gamma_{sat} = 19 \cdot 8 \text{ kN/m}^3$

3. (a) Explain Standard Penetration Test. What is N-value of SPT ?   7

   (b) What will be the gross and net safe bearing pressure of sand having $\phi = 36°$ and effective unit weight 18 kN/m^3 under the following condition :

   (i)   1 m × 1 m square footing

   (ii) Circular footing of diameter 1 m

   Use Terzaghi's analysis. For $\phi = 36°$, $N_q = 47$ and $N_\gamma = 50$. Consider that the footings are placed at 1 m depth from general ground level. Assume a factor of safety of 3.   7

4. (a) What are the causes of settlement of foundation ? Explain the difference between immediate, primary and secondary consolidation. 7

   (b) Name the different types of foundations. Show by neat sketch any two of them. 7

5. What do you understand by raft foundation ? Under which conditions is raft foundation recommended ? Explain the I.S. code method of design of raft foundations by conventional method (Rigid foundation design). *14*

6. (a) Classify different types of piles. *5*

   (b) A group of 9 piles, 10 m long is used as a foundation for a pier. 3 piles are in a row and the diameter of each pile is 300 mm with center-to-centre spacing of 900 mm. The unconfined compressive strength of clay is 150 kN/m^2. Determine the efficiency, neglecting end bearing effect. 9

7. Write short notes on the following :

   (a) Safe Bearing Capacity and Ultimate Bearing Capacity of Soil *4*

   (b) Well Foundation *5*

   (c) Disturbed and Undisturbed Soil Sample *5*

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