B.Tech. CIVIL ENGINEERING (BTCLEVI)

Term-End Examination

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June, 2017

BICE-012(S) : GEOTECHNICAL ENGINEERING – II

Time : 3 hours   *Maximum Marks : 70*

Note : *Attempt any **five** questions. Use of scientific calculator is permitted.*

1. (a) What are the different methods of subsurface exploration ? Discuss any one method in brief.   7

     (b) Discuss the purpose and procedure of the field vane shear test.   7

2. (a) What are the assumptions of the Rankine's theory of lateral earth pressure ? With the help of a neat sketch, show the variation of earth pressure for dry or moist backfill with no surcharge. Write the expression for total active earth pressure and show its points of application in the active earth pressure diagram.   7

(b) Compute the intensity of passive earth pressure at a depth of 8 m in cohesionless sand with an angle of internal friction of 30° when water rises to the ground level. Saturated unit weight of sand is 21 kN/m^3 and γ_w = 9·81 kN/m^3.   7

3. (a) A 2·25 m × 2·25 m square footing is located at a depth of 1·5 m in sand of unit weight 18 kN/m^3. The shear strength parameters are : c' = 0 and ϕ = 36°. Calculate the safe load carried by the footing against complete shear failure. Factor of safety against shear failure is 3. Use Terzaghi's analysis. N_c = 65·4, N_q = 49·4, N_γ = 54·0.   7

(b) Discuss the limitations of plate load test and also the effect of the size of plate on bearing capacity.   7

4. (a) Discuss in brief, different types of foundations and their suitability in different soil and load conditions.   7

(b) In the laboratory test on a clay sample of thickness 25 mm drained at top only, 50% consolidation occurred in 11 minutes. Find the time required for the corresponding clay layer in the field, 2 m thick and drained at top and bottom to undergo 70% consolidation. Assume T_{50} = 0·197 and T_{70} = 0·405.   7

5. (a) Why do we need supports for deep excavation ? With the help of a neat sketch, describe a support system for deep excavation. 7

(b) With the help of neat sketches, discuss the design considerations for a combined footing. 7

6. (a) What is a pneumatic caisson ? How is it different from a box caisson ? Draw the section of a pneumatic caisson. 7

(b) What do you understand by tilts and shifts in well sinking ? What precautions should be taken to avoid tilts and shifts ? 7

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

(a) Under-Reamed Piles

(b) Types of Bearing Capacity Failures

(c) Osterberg Piston Sampler

(d) Depth of Exploration