Roll No. .....

3704

B. Tech. 8th Semester (Civil Engg.)

Examination – May, 2023

GEOTECHNOLOGY

Paper : PEC-CEEL-408-G

Time : Three Hours] *[Maximum Marks : 75*

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : (i) Question No. 1 is ***compulsory***. Attempt ***one*** question from each section.

(ii) All questions carry equal marks.

(iii) Assume missing data, if any, suitably.

1. (a) Enumerate different factors affecting slope stability.

(b) Necessity of braced cuts

(c) Differentiate cantilever and anchored sheet piles.

(d) Degree of freedom in machine foundation.

(e) Define soil stabilization.

(f) Components of a finite and infinite slope. 15

SECTION – A

2. (a) What are the different types of slopes ? Describe the stability of finite slopes by method of slices. 7

(b) Derive an expression for the factor of safety of an infinite slope in a cohesionless soil. 8

3. (a) Briefly describe total stress analysis and effective stress analysis for stability of slopes. 7

(b) What is Stability number ? Describe its uses. 8

SECTION – B

4. (a) Draw the apparent pressure distribution diagrams recommended by Terzaghi and Peck for cuts in sand, firm clay and soft clay. Also determine how the load can be calculated in each case ? 7

(b) What is sheeting and bracing system ? Describe the different types of sheeting and bracing systems. 8

5. (a) Describe in detail the stability analysis of cellular coffer dam on rocks. 7

(b) What is the necessity of coffer dam ? Differentiate between braced cuts and coffer dam. 8

SECTION – C

6. (a) Find the depth of embedment to penetrate a cantilever sheet pile granular soil. The height of backfill is 5 m, with water table standing to mid height on either side. Take $\gamma = 20 kN/m^3$ and $\Phi = 30°$; $\gamma = 9\ kN/m^3$ and $\Phi = 30°$. Use approximate method. 10

(b) What are the different types of sheet pile ? Explain briefly. 5

7. An excavation 8 m deep is to be made in cohesionless soil having $\gamma = 16\ kN/m^3$, $\Phi = 35°$. Determine the minimum depth of embedment for equilibrium. The anchors and water table are at a depth of 2.5 m and 3 m below the ground surface. Assume free earth support conditions. 15

SECTION – D

8. (a) What do you mean by soil improvement ? Enumerate the different methods to stabilize the soil. 7

(b) Describe in brief the cement stabilization. What are the factors affecting the stability of soil cement ? Discuss construction methods. 8

9. (a) Describe the characteristics elements of a vibratory system. 8

(b) Define natural frequency for machine foundation. Analyse Barken's method for determining natural frequency of a block foundation subjected to oscillation. 7
