

Faculty of Engineering & Technology**Fifth Semester B.E. (Civil Engg.) (C.B.S.) Examination****GEOTECHNICAL ENGINEERING—II**

Time : Three Hours]

[Maximum Marks : 80

INSTRUCTIONS TO CANDIDATES

- (1) All questions carry marks as indicated.
 - (2) Due credit will be given to neatness and adequate dimensions.
 - (3) Assume suitable data wherever necessary.
1. (a) Explain any one geophysical method of exploration and its limitation. 6
- (b) Compute the area ratio of a thin walled tube sampler having an external diameter of 60 mm and wall thickness of 2.25 mm. Do you recommend this sampler to obtain undisturbed samples ? Why ? 5
- (c) What is the importance of exploration ? 3

OR

2. (a) Explain boring sampling record. 6
- (b) Enlist various methods of Boring and explain any one in detail. 5
- (c) Explain types of samples. 3

3. (a) Explain 'Friction circle method' of slope stability analysis. 6
- (b) An infinite slope is made of clay having angle of inclination of 30° . $C = 25 \text{ kN/m}$, $\phi = 20^\circ$, $e = 0.65$ and $G = 2.7$. Analyse the slope under the following conditions :
- (i) When soil is dry.
- (ii) When water seeps parallel to the surface of the slope. 7

OR

4. (a) Explain types of slope failure and method of improving stability of slopes. 8
- (b) An embankment is to be constructed with slope angle of 30° in a soil whose properties are $C = 36 \text{ kN/m}^2$, $\phi = 15^\circ$ and $\gamma = 19 \text{ kN/m}^3$. What should be the safe height of an embankment for a factor of safety of 1.5 ? The stability numbers are :

i \ ϕ	5°	10°	15°	20°	25°
30°	0.110	0.075	0.046	0.025	0.009
45°	0.136	0.108	0.083	0.062	0.044

5

5. (a) Explain the terms :
- (i) Active earth pressure

(ii) Passive earth pressure

(iii) Earth pressure at rest. 3

- (b) The following data pertains to a retaining wall, Height of wall = 7.0 m, Batter angle = 10° , Angle of wall friction = 20° , unit weight of soil = 16.5 kN/m^3 , Angle of internal friction = 30° , surcharge angle = 10° . Compute the total active thrust on a wall, use Rebhann's method. 10

OR

(a) State the assumptions and limitations of Rankine's theory of active earth pressure. 6

(b) A vertical cut of 4 m depth is to be made in the soil whose properties are : $C = 20 \text{ kN/m}^2$, $\phi = 12^\circ$ and $\gamma = 18 \text{ kN/m}^3$. Determine the lateral stresses in soil at the top and the bottom of the cut. Also determine the maximum depth of potential cracks and the maximum depth of supported excavation. 7

7. (a) Discuss the principles of ground improvement and its importance. 6

(b) Write a short note on 'Vibroflotation' technique with neat sketches. 7

OR

8. (a) Write short notes on :
- 'Lime Stabilisation' 6
 - 'Sand drains'. 6
- (b) Write short note on 'Geotextiles' and its applications in Civil Engineering works. 7
9. (a) Explain :
- Local shear failure 6
 - General shear failure and 6
 - Punching shear failure. 6
- (b) A column carries a load of 1000 kN. The soil is dry sand, a minimum factor of safety of 2.5 is required, if $\phi = 30^\circ$ & $N_c = 37.2$, $N_q = 22.5$ & $N_o = 19.7$ so, find :
- The size of the square footing placed on the ground surface. 8
 - The size of the square footing if it is placed 1 m below the ground surface with water table at ground. 8

OR

10. (a) Discuss the effect of ground water table on bearing capacity. 6
- (b) A plate load test was conducted on a uniform deposit of sand and the following data were obtained :

Pressure (kN/m ²)	Settlement (mm)
50	1.5
100	2.0
200	4.0
300	7.5
400	12.5
500	20.0
600	40.0

- Calculate ultimate bearing capacity of the soil. 8
11. (a) Explain with neat sketches under-reamed pile and their uses. 6
- (b) A concrete pile 40 cm × 40 cm and 20 m long is driven with a drop hammer weight 40 kN and height of fall 1 m. The set of pile is 6 mm per blow. The efficiency of hammer is 100%. Find the ultimate load on the pile. Coefficient of restitution is 0.4 and total elastic compression is 25 mm. 8

OR

12. (a) Write short notes on :
- 'Negative Skin Friction' 8
 - Classification of Pile Foundation. 8
- (b) Explain group efficiency of piles and various approaches to determine it. 6