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

MLV—6919   1   (Contd.)

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°. $C = 25$ kN/m, $\phi = 20°$, $e = 0.65$ 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 $C = 36$ kN/m², $\phi = 15°$ and $\gamma = 19$ kN/m³. 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/m³, Angle of internal friction = 30°, surcharge angle = 10°. Compute the total active thrust on a wall, use Rebhann's method.   10

OR

i. (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 kN/m², $\phi = 12°$ and $\gamma = 18$ kN/m³. 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 :

(i) 'Lime Stabilisation'

(ii) 'Sand drains'. 6

(b) Write short note on 'Geotextiles' and its applications in Civil Engineering works. 7

9. (a) Explain :

(i) Local shear failure

(ii) General shear failure and

(iii) 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 $\phi = 30°$ & $N_c = 37.2$, $N_q = 22.5$ & $N_v = 19.7$ so, find :

(i) The size of the square footing placed on the ground surface.

(ii) 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 efffect 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/m²)	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 :

(i) 'Negative Skin Friction'

(ii) Classification of Pile Foundation. 8

(b) Explain group efficiency of piles and various approaches to determine it. 6