

B.E. (Civil Engineering) Fifth Semester (C.B.S.)

Geotechnical Engineering – II

P. Pages : 2

Time : Three Hours

**NRT/KS/19/3406**

Max. Marks : 80

- Notes :
1. All questions carry marks as indicated.
 2. Solve Question 1 OR Questions No. 2.
 3. Solve Question 3 OR Questions No. 4.
 4. Solve Question 5 OR Questions No. 6.
 5. Solve Question 7 OR Questions No. 8.
 6. Solve Question 9 OR Questions No. 10.
 7. Solve Question 11 OR Questions No. 12.
 8. Due credit will be given to neatness and adequate dimensions.
 9. Assume suitable data whenever necessary.
 10. Illustrate your answers whenever necessary with the help of neat sketches.
 11. Use of non programmable calculator is permitted.

1. a) What do you understand by the term disturbed and undisturbed soil samples? State clearly the significance of the following in sampling. 7
 - i) Area ratio
 - ii) Inside clearance
 - iii) Outside clearance ratio
 - b) What are Geophysical methods? Explain any one method with its limitations. 6
- OR**
2. a) Enlist various methods of boring. Explain wash boring with help of neat sketch. 7
 - b) Explain the procedure of standard penetration test with diagram. Explain its corrections. 6
 3. a) Explain Taylor's Stability Number. 7
 - b) A infinite slope is made up of clay soil having following properties $\phi=16^\circ$, $C=25\text{kN/m}^2$, $G=2.72$, $e=0.5$. If the slope angle is 26° and height equal to 6 m. Determine the stability of the slope when the slope is dry, submerged and there is seepage parallel to the slope. 7
- OR**
4. a) Explain friction circle method with a neat sketch. 7
 - b) An embankment is to be made of sandy clay has $r=19\text{kN/m}^3$, $C=30\text{kN/m}^2$ and $\phi=25^\circ$. The slope and height of embankment are 1.5 : 1 and 10 m resp. Find f.o.s. using method of slices, $\alpha_a=26^\circ$ and $\alpha_b=35^\circ$. 7
 5. a) Explain the movement of wall through Mohr's circle method. 6
 - a) earth pressure at rest condⁿ
 - b) Active earth pressure
 - c) Passive earth pressure.
 - b) A two layer cohesive horizontal backfill is supported by a 10 m high vertical smooth wall. Determine the Rankine's active force per unit length of the wall before and after tension crack develop in the top layer. The details of the soil properties are given below. 7

Properties	Top layer	Bottom layer
Depth	0.5 m	5 – 10 m
Cohesion	12kN/m ²	35kN/m ²
Angle of internal friction	0°	10°
Unit weight	17kN/m ³	18kN/m ³

OR

6. a) Give the critical comparison between Rankines and Coulomb Earth pressure theories. **6**
- b) A retaining wall 3.6 m high supports a dry cohesionless backfill with a plane ground surface sloping upwards at a surcharge angle of 10° from top of the wall. The back of the wall is inclined to the vertical at a positive batter angle of 9° . The unit weight of the backfill is 18.9kN/m^3 and $\phi = 30^\circ$. Assuming wall friction angle of 12° . Determine the total Active Earth pressure by Rehbhhan's method. **7**
7. a) Explain Ground Improvement Technique using Sand Drains. **6**
- b) Write short notes on function and application of Geosynthetics. **7**
- OR**
8. a) Write short notes on Reinforced Earth. **6**
- b) Write short notes on Vibroflotation Technique with neat sketch. **7**
9. a) Explain various modes of shear failure in soil with suitable sketch. **6**
- b) Determine depth at which a circular footing of 2 m diameter to be laid, if it has to carry a safe load of 1600 kN. The soil is having following properties $C = 10\text{kN/m}^2$, $\phi = 30^\circ$, $\gamma = 18\text{kN/m}^3$, Take $N_c = 37.2$, $N_q = 22.5$, $N_v = 19.7$ Assume f.o.s. = 2. **7**
- OR**
10. a) Explain the procedure of plate load test with assumption and limitations. **6**
- b) A square footing of size $1.3\text{m} \times 1.3\text{m}$ is located at depth of 1m below ground level. The soil properties are $C = 22\text{kN/m}^2$, $\phi = 22^\circ$ and $\gamma = 18\text{kN/m}^3$. Determine net ultimate bearing capacity without water table effect. Also determine the change in net ultimate bearing capacity if water table rises 0.5 m above the foundation level $N_c = 22.5$, $N_q = 10.2$ & $N_v = 8.1$. **7**
11. a) Explain the phenomenon of negative skin friction. **7**
- b) A group of 9 piles arranged in a square pattern with diameter and length of each pile as 0.25 m and 10 m resp. is used as a foundation in soft clay deposite. Taking unconfined compressive strength of clay as 120kN/m^2 and pile spacing 1 m center to center. Find the load capacity of the pile group. Take $\alpha = 0.75$ and $N_c = 9$, f.o.s. = 2.5 may be taken. **7**
- OR**
12. a) Explain how piles are classified. **7**
- b) On a project pile load of 600 kN was desired. A pile load test was conducted and the results are given below. **7**

Load (kN)	0	300	550	800	1050	1300	1550
Settlement (mm)	0	4.5	5.5	9.5	14.0	21.3	30.0

Determine the adequacy of the test pile. Also mention the criteria adopted to specify the adequacy of f.o.s. = 2.
