R18

Code No: 156BA

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech III Year II Semester Examinations, July - 2023

FOUNDATION ENGINEERING

(Civil Engineering)

Time: 3 Hours **Max. Marks: 75**

Note: i) Question paper consists of Part A, Part B.
ii) Part A is compulsory, which carries 25 marks. In Part A, Answer all questions.
iii) In Part B, Answer any one question from each unit. Each question carries 10 marks and may have a, b as sub questions.

PART – A

(25 Marks)

1.a)	What is 'N-value' of Standard Penetration Test?	[2]
b)	How soil samples are classified based on the amount of disturbance in sampling?	[3]
c)	If the angle of inclination of the infinite slope is 'I' and the granular soil has frictional resistance is ϕ, then what is the factor of safety of that infinite slope?	[2]
d)	Define the factor of safety of the slope with respect to frictional resistance.	[3]
e)	What are the stability checks made for stability of the retaining walls?	[2]
f)	Write down the filter criteria to control the piping.	[3]
g)	Define ultimate bearing capacity.	[2]
h)	What are the factors affect the bearing capacity of a shallow foundation?	[3]
i)	What is the basis on which the dynamic formulae are derived?	[2]
j)	What did you understand about the efficiency of the pile group? Critically discuss.	[3]

PART – B

(50 Marks)

2.a) Write briefly about the Standard penetration test conducted in the field. What are the corrections to be made to the standard penetration value? Why? Discuss.

b) What are the design requirements for an undisturbed sample? [7+3]

OR

3.a) Explain the terms 'inside clearance' and 'outside clearance' as applied to a sampler. Why are they provided?

b) A N-value of 35 was obtained for a fine sand below water-table. What is the corrected value of N? [5+5]

4.a) Write critical notes on the friction circle method of analysing the stability of slopes.

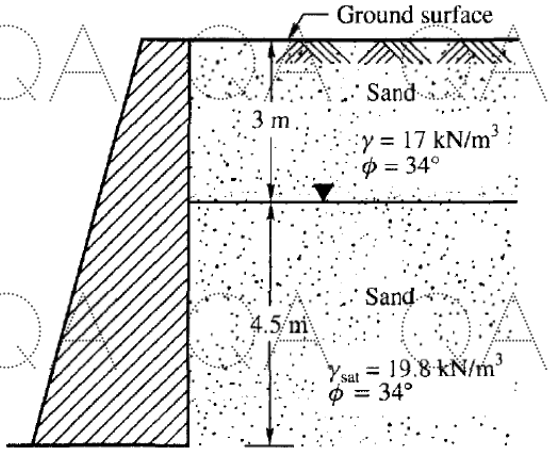
b) A 40-degree clay slope has a height of 5 m. Assuming a toe circle failure starting 1 m from the edge of the slope (at the top), calculate the shear strength required for the soil for a factor of safety of 1.5. Assume Unit weight of soil, $\gamma = 19.6$ kN/m^3. Take Taylor's N as 0.1817. [5+5]

OR

5.a) Derive the expression for factor of safety of a finite slope using Bishop Simplified method.

b) Critically discuss the basic assumptions made in the stability analysis of slopes. [6+4]

6. The below figure shows a rigid retaining wall. Determine the active thrust on this wall and the point of application of the resultant force. [10]



OR

7.a) What are the design criteria to be satisfied for the stability of a gravity retaining wall ? Indicate briefly how you will ensure the same.

b) Determine the active and passive earth pressure given the following data: Height of retaining wall = 10 m; $\varphi = 25^0$; γ_d = 17 kN/m^3. Ground water table is at the top of the retaining wall. [5+5]

8. A square footing is required to carry a net load of 1000 kN at a depth of 1 m. Taking a factor of safety of 3. Determine the width of the footing. Take $\Phi = 30^0$. γ = 20 kn/m^3, C = 20 kN/m^2. Use Terzaghi theory. Assume general shear failure. For $\Phi = 30^0$, N_c = 37.2, N_q =22.5, and N_γ = 19.7 [10]

OR

9.a) Differentiate between 'total settlement' and 'differential settlement'. What are the harmful effects of differential settlement on structures? What are the possible remedial measures?

b) Compute the safe bearing capacity of a square footing 1.5 m × 1.5 m, located at a depth of 1 m below the ground level in a soil of average density 20 kN/m^3. $\varphi = 20^0$, Nc = 17.7, N q = 7.4, and Nγ = 5.0. Assume a suitable factor of safety and that the water table is very deep. Also compute the reduction in safe bearing capacity of the footing if the water table rises to the ground level. [5+5]

10.a) Write brief critical notes on the bearing capacity of piles.

b) A precast concrete pile is driven with a 30 kN drop hammer with a free fall of 1.5 m. The average penetration recorded in the last few blows is 5 mm per blow. Estimate the allowable load on the pile using the Engineering News Formula. [5+5]

OR

11.a) Describe the procedure for the estimation of settlement of a pile group by considering only the frictional resistance of the pile group.

b) A group of 9 piles with 3 piles in a row were driven into a soft clay extending from ground level to a great depth. The diameter and the length of the piles were 40 cm and 20 m respectively. The unconfined compressive strength of the clay is 80 kPa. If the piles were placed at 100 cm center to center, compute the allowable load on the pile group on the basis of shear failure criteria for a factor of safety of 2.5 [5+5]

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