

Code No: 156BA**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD****B. Tech III Year II Semester Examinations, February - 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 do you understand by Geophysical method of soil exploration? [2]
- b) Why should we apply corrections for the N value obtained from the field? [3]
- c) What are the probable types of failure of a slope? [2]
- d) How is Bishop's rigorous analysis different from his simplified method? [3]
- e) Write a note on stability of retaining walls against sliding. [2]
- f) What are the stability requirements for retaining wall? [3]
- g) State the factors affecting location of footing. [2]
- h) Comment on the statement "The net bearing capacity of a shallow foundation in clayey soil is unaffected by the position of water table, where in sandy soil, it is very much affected". [3]
- i) What is negative skin friction? [2]
- j) State the permissible settlements for isolated and raft foundations in clays and Sandy Soils. [3]

PART – B**(50 Marks)**

2. Define significant depth of soil exploration? Give values for depth of soil exploration and number of bore holes for Multi storey buildings, closely spaced footings and Highway in filling and cutting. [10]

OR

- 3.a) Explain in detail the rotary drilling technique. State also its advantages over other methods of boring.
- b) Explain Standard Penetration Test and corrections applied to observed N value. Illustrate test with figure. [5+5]
- 4.a) Calculate the factor of safety with respect to cohesion of clay slope laid at 1 in 2 to a height of 10m, if $\phi=12^\circ$, $c=25\text{kN/m}^2$ and $\gamma=19\text{kN/m}^3$. Calculate the safe height of the embankment for a factor of safety of 1.5. Assume the stability number as 0.91.
- b) What is stability factor? Discuss the importance and uses of stability charts in the analysis of stability of slopes. [5+5]

OR

5. An infinite dry sandy slope is just stable at a slope angle of 35° . Unit weight of sand = 20 kN/m^3 . In monsoon, water starts flowing through the sand down the slope. At what inclination of slope will it be stable in such condition? [10]

6. Explain the different types of earth pressures with practical examples. Also explain how you will estimate the total active earth pressure experienced by a retaining wall with a vertical back retaining a cohesionless soil with horizontal surface. [10]

OR

7. What are the different modes of failure of retaining walls? Explain with the help of neat sketches. [10]

8. List the types of foundations and explain how to select the suitable foundation for the given type of structure. Also differentiate between general shear failure, punching shear failure, punching shear failure and local shear failure. [10]

OR

9. A 4 m wide strip footing is founded at a depth of 1.5 m below the ground surface in c- ϕ soil. The water table is at a depth of 5.5 m below ground surface. The properties of soil are: $c' = 35 \text{ kN/m}^2$, $\phi' = 28.63^\circ$, $\gamma_{\text{sat}} = 19 \text{ kN/m}^3$, $\gamma_{\text{bulk}} = 17 \text{ kN/m}^3$, $\gamma_w = 9.81 \text{ kN/m}^3$. Determine the net safe bearing capacity for local shear failure of soil using Terzaghi's theory (Use F.O.S = 2.5). The values of bearing capacity factors for different ϕ' are given below. [10]

ϕ'	N_c	N_q	N_γ
15°	12.9	4.4	2.5
20°	17.7	7.4	5.0
25°	25.1	12.7	9.7
30°	37.2	22.5	19.7

- 10.a) In a two layered cohesive soil, bored piles of 300mm are installed. The top layer has a thickness of 5m and the bottom one is of considerable depth. The "c" value of top layer is 40 kN/m^2 and that of the bottom is 100 kN/m^2 . Determine the length of the pile required to carry a safe load of 400kN. Assume a F.S. of 3.
- b) A drop hammer weighing 60 kN and having an effective fall of 0.75 m drives an RCC pile weighing 30 kN. The average settlement per blow is 1.4 cm. The total elastic compression is 1.8 cm. Assume the coefficient of restitution as 0.3 and a factor of safety is 3, determine the allowable load on pile. [5+5]

OR

11. Design a friction pile group to carry a load of 3500 kN including the weight of pile cap, at a site where the soil is uniform clay to a depth of 10 m underlain by rock. The average compressive strength of clay is 50 kN/m^2 . The clay may be assumed to be of normal sensitivity and normally loaded with a liquid limit of 70%. Adopt a factor of safety 2.5 against shear failure. [10]

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