QP Code : 6251

(3 Hours) [Total Marks : 80

Note: 1. Q. No. 1 is compulsory

2. Solve any 3 out of remaining 5 questions.

Q. 1. Solve any five (4x5)

A. Write short note on Taylor's stability number?

B. Compare Rankine's and Coulombs lateral earth pressure theory.

C. How elastic & consolidation settlements are calculated for footings.

D. Explain any two Dynamic formulae and its limitations.

E. Explain with neat sketch method of construction of Imperfect ditch Conduit.

F. Write short note on Drainage, wall joints and construction of retaining wall.

G. Briefly discuss mechanism of soil- reinforcement interaction.

Q.2. A) A cut has been made at an angle of 38° to the horizontal .A possible circular failure surface has radius =22 m and is passing through the toe of the cut slope and through a point 5 m away on the top ground from the edge of the cut whose centre of gravity of the failure mass is at a distance of 10m from the centre of failure circle .The properties of soil are C= 40 KN/m², ϕ =18°,γ= 20 KN/m³.determine factor of safety that would be available on the said failure surface for the cut .Use Friction circle method 10

B) A retaining wall 7.5 m high ,with a smooth vertical back is pushed against a soil mass having C= 40 KN/m², ϕ =18°,γ= 17.9 KN/m³.What is the total Rankine active pressure if the horizontal soil surface carries a uniform load of 25 KN/m²? What is the point of application of the resultant thrust? In the above problem, all quantities being same, if the wall is pushed towards the backfill, calculate the magnitude and position of the resultant thrust. 10

Q.3. A) A square column foundation is to be designed for a gross allowable total load of 250 KN. If the load is inclined at an angle of 15° to the vertical, determine the width of the foundation. Take factor of safety of 3.0 and use Vesic,s equation. γ= 19 KN/m³, ϕ =35°, C= 5 KN/m².The depth of foundation is1m. (Nc = 46.12, Nq=33.30, Nγ=48.03) 10

B) Explain plate load test, their result interpretation & limitations. 07

C) Explain how footing should be laid on sloping ground. 03

Q.4. A) Determine the load carrying capacity of a group of 9 piles .Diameter of pile is 400 mm ,length of pile 15 m long ,Properties of sand are C=0, ϕ=35°, γ_d=15 KN/m³ and γ_{sat} =17 KN/m³., K,tanδ=1.5, critical depth of pile as 7.5 times diameter of pile, N$_q$=70, Properties of clay is γ_{sat} =16 KN/m³ . Soil deposit consist of sand of 20 m thick followed by 4m thick clay layer. The Ground water level is observed at 2m from Ground surface .Also determine the settlement of group piles in clay. Take Cc / (1+e$_0$) = 0.22 10

B) Explain Rebhann's construction method to find active earth pressure. 05

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C) Estimate the load on the struts supporting the open cut with soil deposit as follows:

0.0m to 2.0m – Soft clay (γ =17kN/m³, c=10kN/m², and ϕ=0°)

2.0 m to 5.0m – Medium stiff clay (γ =19kN/ m³· c=30kN/ m², and ϕ=0°)

5.0 m to 12.0m stiff clay(γ =20kN/ m³· c=50kN/ m², and ϕ=0°). The depth of open cut is 6m. Struts are located at 1m, 3m and 5m from the ground level. Horizontal spacing of the struts is 4m.

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Q.5. A) A masonry retaining wall of trapezoidal section with the vertical face on the earth side is 1.5m wide at top and 3.5m wide at the base and is 5m high. It retains a sand slopping at 2 horizontal to 1 vertical. The unit weight of sand is 18kN/ m³ and ϕ =30°. Find the maximum and minimum pressure at the base of wall assuming the unit weight of masonry as 23kN/ m³.(Figure is given below)

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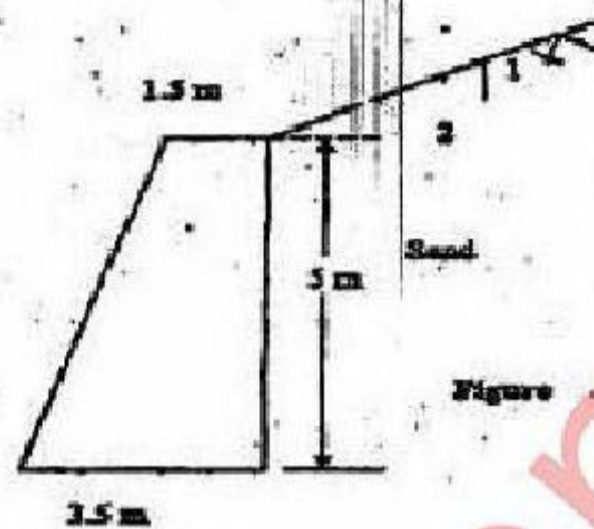
B) Compute the depth of embedment for the sheet pile wall as shown in figure

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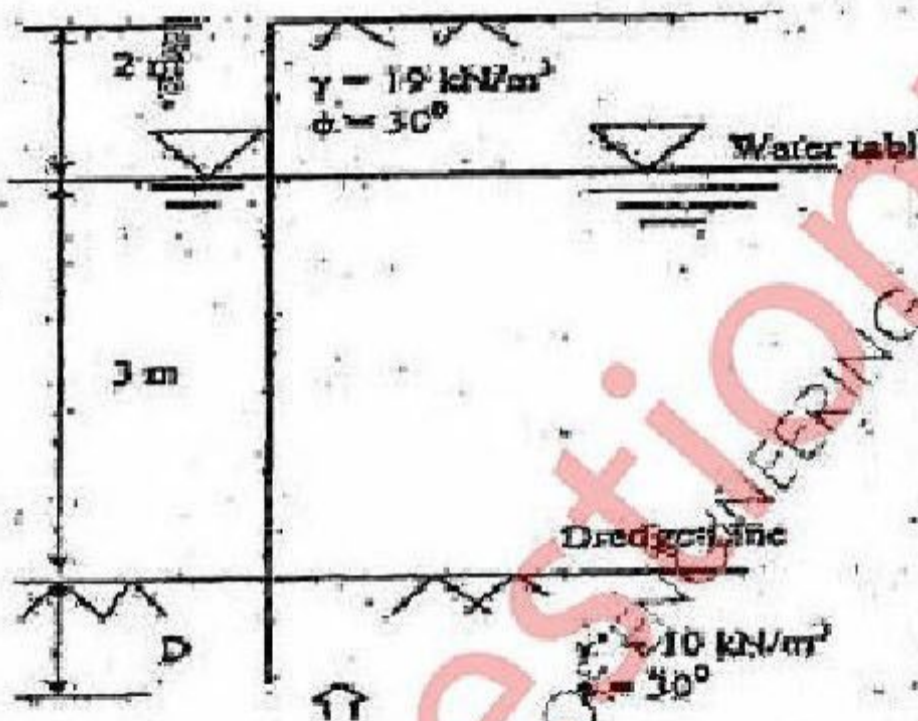
C) Discuss about the factors affecting bearing capacity of soil.

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OR

D) Write assumptions of Terzaghi's Analysis for bearing capacity of shallow foundation.

Q.6. A) A square footing of size 4x4 m is founded at a depth of 2m below the ground surface in loose to medium dense sand. The corrected standard penetration test value N = 11.Compute the net safe bearing pressure for a settlement of 40 mm using modified equations of a Teng's

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B) Write a short note on Geo-synthetics.

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C) Classify the driven piles according to the function of soil. Support the answer with proper figure.

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