TE/Sem VI/ Civil/ CBSGS/ GEOTECHNICAL ENGG. II

Q. P. Code: 13809

(3 Hours) Max Marks=80

Note 1. Attempt any 4 out of six questions
2. Question 1 is compulsory
3. Assume any suitable data where ever required

Q.1 Attempt any four

a. A granular soil has $\phi=35^0$ $\gamma_{sat}=19$ kN/m³. A slope has to be made of this material. If the factor of safety of 1.3 is needed against slope failure, find the safe angle of slope when the slope is dry or submerged without seepage. Also find the factor of safety at a depth of 4m for the same slope if the seepage occurs parallel to the slope with the water table at the depth of 1.5m from the ground level assume angle of slope as 28^0 — 05

b. Briefly explain different stability checks gravity retaining wall by showing minimum values of factor of safety — 05

c. Compare Rankine's and Coulomb's lateral earth pressure theories — 05

d. A circular pile penetrates through a filled up soil of 3m depth. The diameter is 250mm, unit cohesion of material is C=18kN/m² the unit weight is 15 kN/m³ Draw the section elevation and find the negative skin friction of pile. Given the adhesion factor as 0.4 — 05

e. With the help of neat sketches explain projection condition and ditch condition — 05

f. Explain briefly the design of reinforced earth walls with neat sketch — 05

Q.2 a. A cut has to be made 12m deep, inclined at an angle of 35^0 to the horizontal. The possible circular failure surface has a radius equal to 20.2m, and is passing through the toe of cut slope and through the point 4m away on the top ground from the edge of cut. The C.G of the failure mass is at a distance of 9.4m from the center of the failure circle. The properties of soil are C=30kN/m² $\phi=15^0$ and $\gamma=20$kN/m³ find the factor of safety that would be available on failure surface by friction circle method — 10

b. A retaining wall 8m high retains sand with $\phi=30^0$ and $\gamma=24$kN/m³upto a depth of 4m from the top. From 4to 8m, the material is a cohesive soil with having C=20kN/m² and $\phi=20^0$ $\gamma=18$kN/m³.the water table is at a depth of 5m from the ground level $\gamma_{sat}=21$kN/m³ for cohesive soil. Find the total active thrust on the wall along with its point of application. — 10

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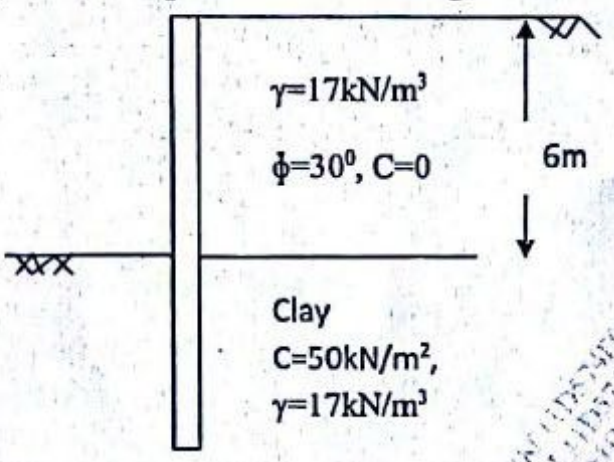
Q.3 a. For the sheet pile wall shown in figure find the depth of embedment 12



b. Explain briefly Rebhan's graphical method for finding active earth pressure 08

Q.4 a. A rectangular footing has a size of 1.8mX3m and has to transmit the load of column at a depth of 1.5m calculate the safe load which the footing can carry use IS code method given n=40%, G=2.67, w=15%, C=8kN/m² ϕ=33⁰ N_c=38.13,N_q=25.86, N γ=35.2 for ϕ=33⁰ 10

b. A 12m long and 300mm diameter concrete pile is driven in a uniform deposit of sand. The water table is very much low. the γ=18kN/m³ N_q=137. Calculate the safe load capacity of pile K=2.0 assume the critical depth as 15 times the diameter of pile 10

Q.5 a. A square group of 25 piles of length 10m were embedded in stiff clay. The piles are 0.5m in diameter and are spaced at 1m center to center in the group: The undrained shear strength at the base level is 180kPa and the average value of undrained shear strength over the depth of pile is 110kPa. $\alpha = 0.45$, estimate the capacity of pile group considering factor of safety of 2.5 also find the efficiency of pile group by converse laberre formula 12

b. A footing in a loose sand 4m wide , 6m long and 1.5m deep the soil properties are γ=16kN/m³ ϕ=22⁰ calculate the safe bearing capacity of soil by Terzaghi's theory N_c=17.5,N_q=8.3, N γ=5.5 for ϕ=22⁰ 08

Q.6 a. Determine the reactions and forces in the struts for the bracing system to support an open cut of 10m depth in clayey soil. The struts are provided at 2m, 5m, 8m and 10m from the ground level. C_u=22kN/m² γ=19kN/m³ the center to center spacing of struts along the length of cut is 2.8m. also find the maximum bending moment of Wales 10

b. Describe briefly different types of joints provided in retaining wall 05

c. Elaborate the uses of Taylor's stability number in slope stability analysis 05

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