T.E. Civil CBGS VI
Geotech. Engg-II

23.11.16

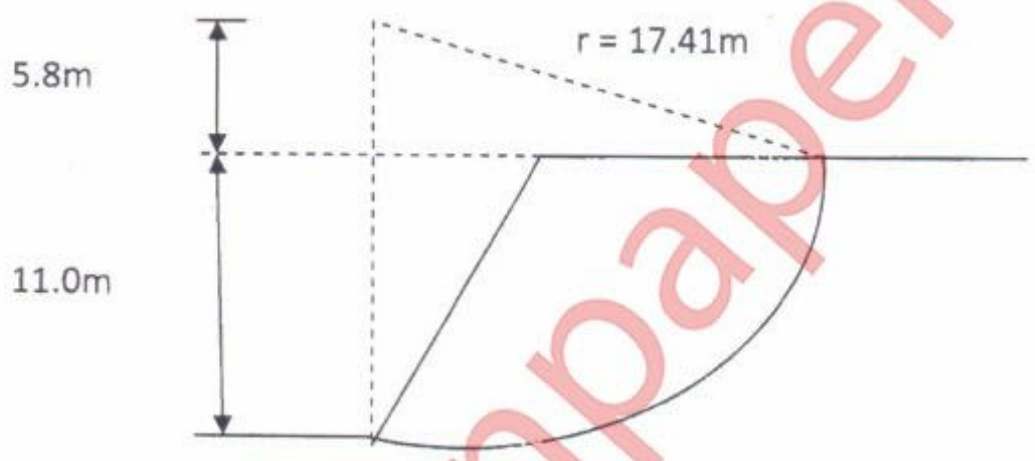
Q.P. Code : 577301

(3 Hours) **[Total Marks : 80**

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

Q-1 (a) Explain with the neat sketch forces acting on ditch conduits. 20
(b) What are the assumptions of Rankine's theory? Derive the expression for active and passive earth pressure.
(c) Write a note on under-reamed piles.
(d) Discuss the effect of water table on the bearing capacity of the soil.

Q-2 (a) Write a note on Taylor Stability number. 06
(b) Explain limitations of plate load test. 06
(c) Determine the factor of safety against sliding for the slip surface shown in the figure (1) Use Swedish circle method. Soil properties are $c = 15kN/m^2$, $\Phi = 30^o$ and $\gamma = 18kN/m^3$. Slope of embankment is 1:1.5. 08



Q-3 (a) What are different types of slope failures? Explain briefly finite and infinite slopes. 06
(b) Explain friction circle method for the stability analysis of slopes. 06
(c) What will be the gross net bearing capacity of sand having $\Phi = 36^o$ and dry unit weight of 19 kN/m^3 for the following cases; a) 1.5 m wide strip foundation, b) 1.5 m x 1.5 m square footing, c) 0.75 m radius circular footing. The footings are placed at a depth of 1.5 m from ground surface. Assume factor of safety of 1.5 and use Terzaghi's bearing capacity equations. 08

ϕ	N_c	N_q	N_γ
35	57.8	41.4	42.4
40	95.7	81.3	100.4

Q-4 (a) A nine pile group arranged in a square pattern is used as a foundation for a column in sand (for $\Phi=32^0$, Nq =27). Piles 300mm in diameter and 10m in length are placed at a spacing of 900mm in each direction. Calculate the ultimate load capacity of the pile group. Assume the unit weight of the soil as $18kN/m^3$. Show the arrangement of piles. 06

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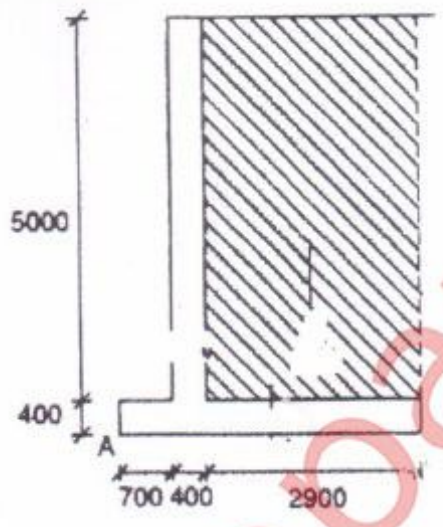
(b) A precast concrete pile (35cmx35cm) is driven by a single acting steam hammer. Estimate the allowable load using (a) ENR formulae (FOS = 6) (b) Hiley Formula (FOS= 4). 06

(c) The cantilever retaining wall shown below is backfilled with granular material having a unit weight, of 21.5kN/m^3 and an internal angle of friction, 32°. Assuming that the allowable bearing pressure of the soil is 120kN/m^2, the coefficient of friction is 0.42 and the unit weight of reinforced concrete is 24kN/m^3. Determine (1) the factors of safety against sliding and overturning. (2) Calculate ground bearing pressures. All 08



dimensions are in mm.

Q-5 (a) What so you understand by contact pressure? What are the factors that influence the contact pressure distribution? Draw the contact pressure distribution diagram for flexible and rigid footings on sand and clayey soils. 06

(b) Explain with the neat diagram different types of reinforcing elements used for soil reinforcement. 06

(c) Show the expression for maximum active/passive earth pressure with a neat diagram behind a retaining wall of height H and supporting a cohesionless backfill for the following cases: (1) dry backfill with no surcharge (2) submerged backfill (3) backfill with uniform surcharge of magnitude q kN/m.(4) backfill with water table at a depth of H_1 below the ground level. 08

Q-6 (a) Define the following term: Ultimate bearing capacity, Active earth pressure, Allowable soil pressure 06

(b) List out various tests on geosynthetics and explain any one briefly. 06

(c) Show that the critical depth of vertical cut in a cohesive soil is given by $4c/(\gamma\sqrt{K_A})$. 08