Enrollment No: _____ Exam Seat No:_____

C.U.SHAH UNIVERSITY

Summer Examination-2018

Subject Name : Geotechnical Engineering- II

Subject Code : 4TE06GTE1 **Branch: B.Tech (Civil)**

Semester : 6 **Date : 02/05/2018** **Time : 02:30 To 05:30** **Marks : 70**

Instructions:

(1) Use of Programmable calculator & any other electronic instrument is prohibited.
(2) Instructions written on main answer book are strictly to be obeyed.
(3) Draw neat diagrams and figures (if necessary) at right places.
(4) Assume suitable data if needed.

Q-1 **Attempt the following questions:** **(14)**

a) If lateral earth pressure is zero in all directions then what is the given site condition ____.

b) What is Taylor's stability number?

c) SPT test gives which properties of soil?

d) Draw the curve showing loading and unloading on pile.

e) Define finite and infinite slopes.

f) Explain the significance of dolly for construction of pile foundation.

g) Give the failure modes of soil slopes.

h) At what angle the soil tends to fail in shear plane in passive case _____.

i) Give the types of piles used for construction.

j) If the coefficient of active pressure is 0.5 then ϕ is _____.

k) What is the meaning of homogeneous and isotropic soil?

l) Define active pressure.

m) What is the use of triaxial shear test.

n) Define angle of shearing resistance of soil.

Attempt any four questions from Q-2 to Q-8

Q-2 **Attempt all questions** **(14)**

a) Explain along with sketches the various earth pressures. **07**

b) Using Mohr-Coulomb diagram derive the expression for active earth pressure for cohesive soils. **07**

Q-3 **Attempt all questions** **(14)**

a) Explain the pile load test along with neat sketches. **06**

b) Explain negative skin friction. A square pile group of nine piles passes through a recently filled up material of 4.5m depth. The diameter of pile is 30cm and pile spacing is 90cm c/c. if the unconfined compressive strength of cohesive material is 60kN/m2 and unit weight is 15kN/m3, compute the negative skin friction. **08**

Q-4 **Attempt all questions** **(14)**

a) Explain plate load test for soil investigation in detail. **08**

b) Give the explanation on effect of water table on bearing capacity of soil. **06**

Q-5 **Attempt all questions** **(14)**

a) A column carries a load of 1000kN. The soil is dry and weighing 19kN/m3 having an angle of internal friction of 40°. A minimum factor of safety of 2.5 is required and Terzaghi factors are required to be used ($N_\gamma = 42$, $N_q = 21$). **08**

i. Find the size of a square footing, if placed at the ground surface and

ii. Find the size of square footing required if it is placed at 1m below ground surface with water table at ground surface. Assume $\gamma_{sat} = 21kN/m^3$.

b) Explain the concept of pressure bulb and its uses in soil mechanics. **04**

c) Define net safe bearing capacity of soil. **02**

Q-6 **Attempt all questions** **(14)**

a) A concentrated load of 22.5kN acts on the surface of homogeneous soil mass of large extent. Find the stress intensity at a depth of 15m and (i) directly under the load, and (ii) at a horizontal distance of 7.5m. Use Boussinesq's equation. **04**

b) A line load of 100kN/m run extends to a long distance. Determine the intensity of vertical stress at a point, 2m below the surface, and (i) directly under the line load and (ii) at a distance of 2m perpendicular to line. Use Boussinesq's equation. **05**

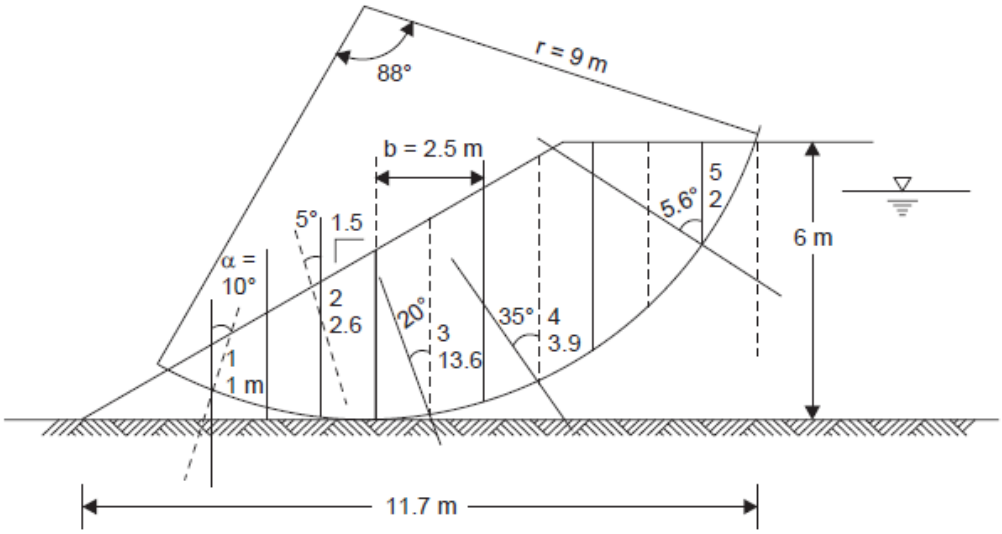
c) A load of 1000kN acts as a point load at the surface of a soil mass. Estimate the stress at a point 3m beow and 4m away from the point of action of the load by Boussinesq's formula. Compare the value with the result from Westergard's theory. **05**

Q-7 **Attempt all questions** **(14)**

a) Explain about Taylor's stability number. What are the uses of stability number? **07**

b) The cross section of an earth dam on an impermeable base is shown as below. The stability of the downstream slope is to be investigated using the slip circle. Determine the factor of safety by conventional approach. ($\gamma_{sat} = 19.5\frac{kN}{m^3}, c' = 9\frac{kN}{m^2}$, $\phi' = 27^\circ, r = 9m, \theta = 88^\circ$). **07**

Slice No.	1	2	3	4	5
r_u	0.360	0.420	0.375	0.300	0.075
W (kN)	42	114	150	162	75



Q-8 **Attempt all questions** **(14)**

a) Explain Coulomb's wedge theory with neat diagrams. Give the comparison of coulomb's theory and Rankine's theory for lateral earth pressure. **08**

b) A wall 5.4m in height retains sand. In the loose state the sand has void ratio of 0.63 and ø = 27˚. In the dense sate, the corresponding values of void ratio are ø are 0.36 and 45˚ respectively. Compare the ratio of active and passive earth pressure in the two cases, assuming G=2.64. **04**

c) Draw the lateral pressure diagram for active condition (i) cohesionless soil (ii) cohesive soil. Also mention the formula to calculate active pressure force. **02**