Enrollment No: _____ Exam Seat No:_____

C.U.SHAH UNIVERSITY
Winter Examination-2018

Subject Name :Geotechnical Engineering - II

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

Semester :6 **Date : 26/10/2018** **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)	What is Newmark's influence chart?	1
b)	What is contact pressure?	1
c)	Give the methods for soil boring.	1
d)	Define net safe bearing capacity of soils.	1
e)	Write the equation for mobilized cohesion.	1
f)	Explain quick sand condition.	1
g)	What is coefficient of subgrade reaction of soil?	1
h)	Give an admixture used for soil stabilization.	1
i)	Geostatic stresses are due to _____.	1
j)	Isobar is a contour of equal stress (True / False).	1
k)	Hand augers are used when the depth is about _____.	1
l)	The depth of exploration for a square footing should be at least _____.	1
m)	For an area of about 0.4 hectares, the minimum number of bore holes is _____.	1
n)	The minimum clear working space for a pit as recommended by IS code is _____.	1

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

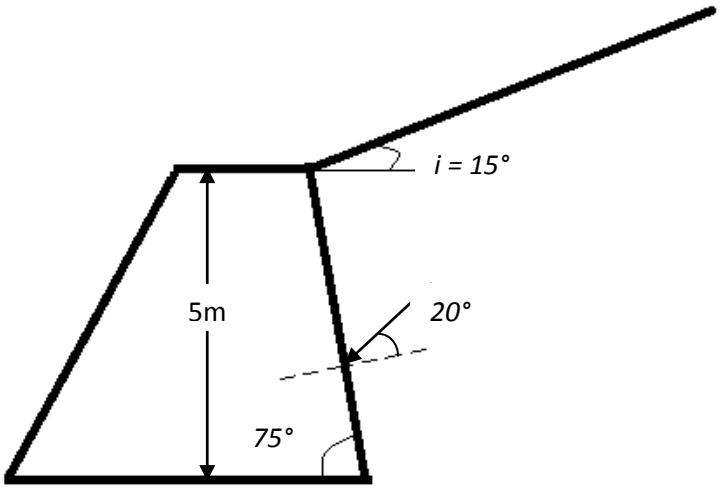
Q-2 **Attempt all questions** **(14)**

a) Derive the equation for active earth pressure when ground surface is horizontal. Also give the assumptions of Rankine's theory. Consider the case for cohesive and non-cohesive soils for derivation. 10

b) Explain types of shear failure in Triaxial test. 04

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

a) Determine the Coulomb active force on the retaining wall as shown in figure. 06
$\phi' = 30^{\circ}$; $\gamma = 17.5kN/m^3$

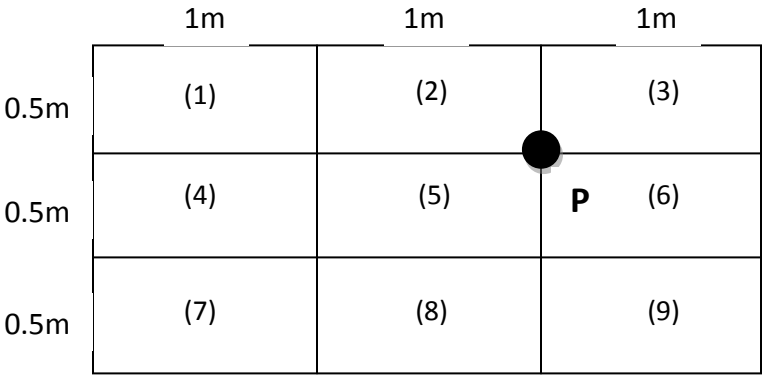


b) What are different types of slope failures? What is stability number? Discuss the utility of stability analysis of slopes. Also, write the uses of stability charts. 08

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

a) Explain the approximate methods for estimation of vertical stresses. 08

b) A rectangular foundation 3m x 1.5m carries a uniform load of 40kN/m^2. Determine the vertical stress at P which is 3m below the ground surface. Use equivalent point load method. 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 30˚. A minimum factor of safety of 2.0 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. 06

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

a) Laboratory results on a soil have shown that its unconfined compressive strength is 1.2kN/cm^2. In a triaxial compression test a specimen of soil when subjected to a chamber pressure of 0.4kg/cm^2 failed at an additional stress of 1.6kg/cm^2. Estimate the shearing strength of the same soil along a horizontal plane at a depth of 4m in the deposit. The groundwater table is at a depth of 2.5m from the ground level. Take dry unit weight of soil as 1.7gm/cc and specific gravity as 2.7. 06

b) A counterfort wall of 10m height retains non-cohesive backfill. The void ratio and angle of internal friction of the backfill respectively are 0.70 and 30 in the loose state, and they are 0.40 and 40 in the dense state. Calculate and compare active and passive earth pressures in both the states. Take specific gravity of soil grains as 2.7. 04

c) A load of 2000kN acts as a point load at the surface of a soil mass. Estimate the stress at a point 3m below and 5m away from the point of action of the load by Boussinesq's formula. Compare the value with the result from Westergard's theory. 04

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

a) What are the different types of settlement which can occur in a foundation? How are these estimated? 07

b) A precast concrete pile (35cm x 35cm) is driven by a single-acting steam hammer. Estimate the allowable load using (a) Engineering News Record Formula (F.S = 6), (b) Hiley Formula (F.S = 4) and (c) Danish formula (F.S = 4). Use the following data: 07

i. Maximum rated energy = 3500 kN-cm
ii. Weight of hammer = 35kN
iii. Length of pile = 15m
iv. Efficiency of hammer = 0.8
v. Coefficient of restitution = 0.5
vi. Weight of pile cap = 3kN
vii. No. of blows for last 25.4mm = 6
viii. Modulus of elasticity of concrete = 2 x 10^7kN/m^2

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

a) A 60cm diameter pile, 11m long, has bell of 2m diameter and 1m height. If the soil has $= 25^{\circ}$, $c_u = 20\ kN/m^2$ and $\gamma = 19\ kN/m^3$, estimate the allowable pull out resistance (FS=3). 06

b) Discuss different methods for installation of piles. 04

c) Explain pile load test setup and the use of pile load test. 04