# C.U.SHAH UNIVERSITY Summer Examination-2019

### Subject Name : Geotechnical Engineering- II

	Subject Code : 4TE06GTE1		Branch: B.Tech (Civil)		
	Semest	er:6 Date:	25/04/2019	Time : 10:30 To 01:30	Marks : 70
	Instruct (1) (2) (3) (4)	ions: Use of Programmable Instructions written o Draw neat diagrams Assume suitable data	e calculator & ar on main answer b and figures (if ne if needed.	ny other electronic instrument is p book are strictly to be obeyed. ecessary) at right places.	rohibited.
Q-1		Attempt the following	ng questions:		(14)
	a)	Enlist the various me	thods of soil san	npler.	
	b)	What is disturbed &	undisturbed sam	ple?	
	c)	Mention the factors a	ffecting the sele	ction of foundation.	
	d)	List the assumptions	made in Terzagł	ni's theory.	
	e)	What is a floating for	undation?		
	f)	Draw the contact pre-	ssure distribution	n diagram below flexible footing r	rest on clay.
	<b>g</b> )	Enlist the various pile	e driving techniq	ues.	
	h)	What are the the vari	ous types of pile	load tests?	
	i)	Define geostatic stres	sses.		
	j)	What are the uses of	influence diagra	m?	
	k)	Write the assumption	s given by Coul	omb's wedge theory.	
	l)	Explicate the types of	f lateral earth pre	essure.	

- **m**) What are the different factors of safety used in stability of slopes?
- **n**) Write the purpose of the friction circle method.

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

## Q-2 Attempt all questions

- (a) Derive the expression for bearing capacity of soils under a strip footing by Terzaghi's (10) analysis with a neat sketch.
- (b) Explain the types of shear failure in foundation with a neat sketch. (04)



#### Q-3 Attempt all questions

- (a) Derive an expression for the vertical stress at a point due to a point load, using (08) Boussinesq's theory.
- (b) A point load of 600 kN act at the surface of an infinite half space. Determine the (06) vertical stresses at a depth of 5 m directly below the load. Also determine the vertical stresses for the same depth at a radial distance of 4 m using Boussinesq's expression.

## Q-4 Attempt all questions

(a)	Discuss the various methods of boring for soil exploration with neat sketches.			
<b>(b)</b>	Explain the different types of shallow foundation with neat sketches.	(06)		
(c)	Write short notes on static cone penetration test.	(02)		

#### Q-5 Attempt all questions

(a) Determine the ultimate bearing capacity of strip footing, 1.2 m wide and 1 m depth (06) with angle of internal friction 10°, cohesion of soil as 15 kPa and density of soil as 18 kN/m<sup>3</sup>. Assume general shear failure and refer Table 1 for bearing capacity factors.

	General shear failure			Local shear failure		
$\Phi'$	N <sub>c</sub>	$N_q$	$N_{\gamma}$	N'c	$N'_q$	N'γ
0	5.7	1.0	0.0	5.7	1.0	0.0
5	7.3	1.6	0.5	6.7	1.4	0.2
10	9.6	2.7	1.2	8.0	1.9	0.5
15	12.9	4.4	2.5	9.7	2.7	0.9

 Table 1 - Terzaghi's bearing capacity factors

- (b) A circular footing rests on pure clay with qu = 270 kN/m<sup>2</sup>, at a depth of 1.8 m. (06) Determine the diameter of the footing if it has to transmit a load of 720 kN. Assume the bulk unit weight of soil as 18 kN/m<sup>3</sup> and the factor of safety as 3. Refer Table.1 for bearing capacity factors.
- (c) Enumerate the components of settlement.

#### Q-6

#### Attempt all questions

- (a) Discuss the various classifications of piles in detail with neat sketches. (06)
- (b) Explain the negative skin friction of piles with a neat sketch. (04)



(02)

(c) What will be the penetration per blow of a pile which must be obtained in driving (04) with a 30 kN steam hammer falling through a 1m if allowable load is 250kN?

## Q-7 Attempt all questions

- (a) Explain with neat sketch find the active earth pressure using Culmann's method. (08)
- (b) A retaining wall, 6 m high, retains dry sand with an angle of friction of 30° and unit (06) weight of 16.2 kN/m<sup>3</sup>. Determine the earth pressure at rest. If the water table rises to the top of the wall, determine the increase in the thrust on the wall. The submerged unit wt of sand as 10 kN/m<sup>3</sup>.

#### Q-8 Attempt all questions

- (a) Derive an expression for simplified Bishop's method. (06)
- (b) How will you classify typical slope failures that occur in a soil mass? Explain with (06) sketches.
- (c) How a slope is analyzed using Swedish circle method. (02)

