Total No. of Questions: 6 *Total No. of Printed Pages:3*

Enrollment No.....

Faculty of Engineering

End Sem (Even) Examination May-2019

CE3ET01 Advance Geo-technical Engineering

Programme: B.Tech. Branch/Specialisation: CE

Duration: 3 Hrs. **Maximum Marks: 60**

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d.

Q.1 i. Allowable bearing pressure for a foundation depends upon: **1**
(a) Allowable settlement only
(b) Ultimate bearing capacity of soil only
(c) Both allowable settlement and ultimate bearing capacity
(d) None of these

ii. According to Terzaghi's theory, the ultimate bearing capacity at ground surface for a purely cohesive soil and for a smooth base of a strip footing: **1**
(a) 2.57 C (b) 5.14 C (c) 5.7 C (d) 6.2 C

iii. Pile foundations are generally preferred to for: **1**
(a) Flexible pavement (b) Sky scrapper buildings
(c) Residential buildings (d) Runways

iv. Which of the following piles is used to compact loose granular soil? **1**
(a) Friction piles (b) End bearing piles
(c) Compaction piles (d) Tension piles

v. Which of the following does not happen when compaction is done? **1**
(a) Permeability decreases (b) Water content increases
(c) Shear strength decreases (d) Compressibility decreases

vi. Geo-synthetics includes _____ main product categories. **1**
(a) 6 (b) 8 (c) 9 (d) 10

P.T.O.

vii. For determining the ultimate bearing capacity of soil, the recommended size of a square bearing plate to be used in load plate test should be 30 to 75 cm square with a minimum thickness of: **1**
(a) 10 mm (b) 15 mm (c) 20 mm (d) 25 mm

viii. An advantage of preferring bored piles is _____ **1**
(a) The concrete is not liable to damage
(b) Vibration caused by driving can be avoided
(c) They need no storage space
(d) No requirement of special handling equipment

ix. Deflection of a sheet pile in a braced cut: **1**
(a) Increases from top to bottom
(b) Decreases from top to bottom
(c) Increase from top and then decreases
(d) Decreases from top and them increases

x. The theory of harmonic vibrations is applicable to _____ for designing of foundation. **1**
(a) Turbines (b) Motors (c) Generators (d) All of these

Q.2 i. Define: Ultimate Bearing Capacity, Net Ultimate Bearing Capacity, Safe Bearing Capacity and Net Safe Bearing Capacity. **2**

ii. Explain the assumptions made in Terzaghi's theory of shallow foundation. Define net and ultimate bearing capacity terms. **8**

OR iii. A strip footing, 1m wide and its base is located at the depth of 0.8m below the ground surface. The properties of the foundation soil are: γ = 18KN/m^3, c = 30KN/m^2 and $\Phi = 20^0$. Determine the safe bearing capacity using the factor of safety of 3. Use Terzaghi's analysis. Assume that the soil fails by local shear. Given $N'_c = 11.8$, $N'_q = 3.9$, $N'_\gamma = 1.7$. **8**

Q.3 i. Explain negative skin friction in pile foundation. **3**

ii. Classify the various types of piles based on material and function. **7**

OR iii. Explain with a neat sketch the construction and working of under-reamed pile. **7**

Q.4 i. Explain in short types and function of Geo-synthetics. **4**

ii. What are the various types of soil stabilization? Explain Mechanical stabilization in detail. **6**

OR iii. What do you understand by field control of compaction? Explain proctor needle method. **6**

Q.5 i. Write short note on Plate Load Test. **3**

ii. Explain with neat sketch electrical resistivity method of soil exploration. **7**

OR iii. Describe with neat sketch wash boring technique to explore soil. **7**

Q.6 Attempt any two:

i. Explain the mass spring analogy. Define the natural frequency. **5**

ii. Explain design procedure of block foundation for impact type of machine. **5**

iii. Write short notes on: **5**
(a) Cofferdams (b) Vibration isolation

******

Marking Scheme
CE3ET01 Advance Geo-technical Engineering

Q.1	i.	Allowable bearing pressure for a foundation depends upon: (c) Both allowable settlement and ultimate bearing capacity		**1**
	ii.	According to Terzaghi's theory, the ultimate bearing capacity at ground surface for a purely cohesive soil and for a smooth base of a strip footing: (b) 5.14 C		**1**
	iii.	Pile foundations are generally preferred to for: (b) Sky scrapper buildings		**1**
	iv.	Which of the following piles is used to compact loose granular soil? (c) Compaction piles		**1**
	v.	Which of the following does not happen when compaction is done? (c) Shear strength decreases		**1**
	vi.	Geo-synthetics includes _____ main product categories. (b) 8		**1**
	vii.	For determining the ultimate bearing capacity of soil, the recommended size of a square bearing plate to be used in load plate test should be 30 to 75 cm square with a minimum thickness of: (d) 25 mm		**1**
	viii.	An advantage of preferring bored piles is _____ (b) Vibration caused by driving can be avoided		**1**
	ix.	Deflection of a sheet pile in a braced cut: (a) Increases from top to bottom		**1**
	x.	The theory of harmonic vibrations is applicable to _____ for designing of foundation. (d) All of these		**1**
Q.2	i.	Each Definition 0.5 mark	(0.5 mark * 4)	**2**
	ii.	Terzaghi's theory of shallow foundation.		**8**
		Assumptions	4 marks	
		Net and ultimate bearing capacity terms.	4 marks	
OR	iii.	Ultimate bearing capacity	5 marks	**8**
		Safe bearing capacity	3 marks	
Q.3	i.	Negative skin friction in pile foundation.		**3**
		Diagram	1 mark	
		Explanation with formula	2 marks	
	ii.	Types of piles based on material and function.		**7**
		1 mark for each type	(1 mark * 7)	
OR	iii.	Construction and working of under-reamed pile.		**7**
		Diagram	2 marks	
		Explanation	5 marks	
Q.4	i.	Two types of Geo-synthetics	2 marks	**4**
		Function of Geo-synthetics.	2 marks	
	ii.	Types of soil stabilization (any four)		**6**
		0.5 mark for each (0.5 mark * 4)	2 marks	
		Mechanical stabilization	4 marks	
OR	iii.	Field control of compaction	2 marks	**6**
		Proctor needle method with diagram	4 marks	
Q.5	i.	Plate Load Test. Theory and diagram		**3**
	ii.	Electrical resistivity method of soil exploration.		**7**
		Diagram	2 marks	
		Theory	5 marks	
OR	iii.	Wash boring technique to explore soil		**7**
		Diagram	2 marks	
		Theory	5 marks	
Q.6		Attempt any two:		
	i.	Mass spring analogy and natural frequency.		**5**
		Diagram	1 mark	
		Theory	2 marks	
		Derivation	2 marks	
	ii.	Procedure of block foundation for impact type of machine.		**5**
		Diagram	2 marks	
		Theory	3 marks	
	iii.	Write short notes on:		**5**
		(a) Cofferdams	2.5 marks	
		(b) Vibration isolation	2.5 marks	

******