Enrollment No.....................................

Faculty of Engineering
End Sem Examination May-2023
CE3ET01 Advance Geotechnical 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. Assume suitable data if necessary. Notations and symbols have their usual meaning.

Q.1 i.   The concept of analysis of bearing capacity failure was first developed by _____.   1
          (a) Terzaghi   (b) Meyerhof (c) Prandtl   (d) Darcy

     ii. The parameters N_c, N_q, N_γ in the equations of bearing capacity failure are known as _____.   1
          (a) Constant head   (b) Bearing capacity factors
          (c) Effective pressure   (d) Load intensity

     iii. The gross pressure intensity (q) of a structure is _____.   1
          (a) Total pressure at base of the footing
          (b) Excess pressure after the construction of the structure
          (c) Minimum pressure intensity at the base
          (d) None of these

     iv. The maximum load which can be carried by a pile is defined as its _____.   1
          (a) Ultimate load carrying capacity
          (b) Ultimate bearing resistance
          (c) Ultimate bearing capacity
          (d) All of these

     v.   The number of layers of soil compaction depends on _____.   1
          (a) Type of soil and amount of compaction required
          (b) Water content of soil
          (c) Both (a) and (b)
          (d) None of these

P.T.O.

vi. In standard compactor test, soil is compacted into _____ layers. **1**
(a) 2   (b) 4   (c) 3   (d) 5

vii. Depending upon the details, the site exploration may be classified as- **1**
(a) General and detailed   (b) Complex
(c) Both (a) and (b)   (d) None of these

viii. What are the methods used for general exploration? **1**
(a) Subsurface penetration   (b) Ground water exploration
(c) Rock Cuttings   (d) All of these

ix. Most of the motions encountered in soil dynamics are _____. **1**
(a) Horizontal motion   (b) Motion by impact
(c) Plane linear motion   (d) All of these

x. The rotation of foundation about y axes is known as _____. **1**
(a) Yawning   (b) Rocking   (c) Pitching   (d) All of these

Q.2 i. Enlist any four factors effecting the selection of foundation. **2**

ii. Explain Meyerhoff's method in brief. **3**

iii. A square footing 2.5 m X 2.5 m is built in a homogenous bed of sand **5** of unit weight 18 kN/m2 and having an angle of shearing resistance of 45°. The depth of the base of footing is 2 m below the ground surface. Calculate the safe load that can be carried by a footing with a factor of safety of 2 against complete shear failure. Use Terzaghi's analysis.

OR iv. Explain Rankine's theory to determine depth of foundation in detail **5** with neat sketch.

Q.3 i. Enlist the various types of piles. **2**

ii. Explain static and dynamic formulae for pile foundation. **8**

OR iii. In a 16-group, the pile diameter is 35 cm and centre to centre spacing **8** of the square group is 2 m. If c = 50 kN/m^2, determine whether the failure would occur with the pile acting individually or as a group? Neglect the tip of the pile. All piles are 8 m long. Take m = 0.7 for shear mobilization factor of each pile.

Q.4 i. Enlist the various methods of compaction and explain any one in **4** detail.

ii. What do you mean by soil stabilisation? Differentiate between thermal **6** and electrical stabilisation.

OR iii. What are various types of Geo-synthetics? Explain in detail. **6**

Q.5 Attempt any two:

i. Explain in detail the CNS layer with the help of neat sketch. **5**

ii. Enlist the types of boring and explain any two in detail. **5**

iii. Write a brief note on open drive soil samplers. **5**

Q.6 i. Define and discuss the utility of cofferdam. **3**

ii. Explain mass spring analogy and natural frequency of machine **7** foundation.

OR iii. Discuss the use of single degree freedom system in the analysis of **7** machine foundation. What are its limitations?

******

Marking Scheme
CE3ET01 (T)-Advance Geotechnical Engineering

Q.1	i)	c) Prandtl	1
	ii)	b) Bearing capacity factors	1
	iii)	a) Total pressure at base of the footing	1
	iv)	d) All of the mentioned	1
	v)	a) Type of soil and Amount of compaction required	1
	vi)	c) 3	1
	vii)	a) General and Detailed	1
	viii)	a) Subsurface penetration	1
	ix)	d) All of these	1
	x)	b) Rocking	1

Q.2	i.	0.5 marks for each factor.	2
	ii.	2 marks for explanation	
		1 mark for related formulae.	3
	iii.	2 marks for correct formula	
		2 marks for Calculation	
		1 mark for Answer.	5
OR	iv.	4 marks for explanation	
		1 mark for Diagram.	5

Q.3	i.	0.5 marks for each type of pile (any 4)	2
	ii.	4 marks each for Static and Dynamic Analysis.	8
OR	iii.	2 marks for correct formulae used	
		2 marks for calculations	
		4 marks for Answer with explanation.	8

Q.4	i.	2 marks for methods (any 4)	
		2 marks for explanation of any one.	4
	ii.	2 marks for Soil Stabilisation	
		4 marks for differences (any 4).	6
OR	iii.	1 mark for each geo-synthetic with explanation (any 6)	6

Q.5		Attempt any two	
	i.	2 marks for sketch	
		3 marks for explanation.	5
	ii.	2 mark for types of boring (4 types)	
		1.5 mark for each explanation (any 2)	5
	iii.	1 mark for introduction	
		1 mark for specifications	
		3 marks for types with explanation (any 3).	5

Q.6	i.	1 mark for definition	
		2 marks for utility.	3
	ii.	3.5 marks each for mass spring analogy and natural frequency (with explanation).	7
	iii.	5 marks for use of Single Degree Freedom System	
		2 marks for limitations.	

******