

Reg No.: \_\_\_\_\_

Name: \_\_\_\_\_

**APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY**  
**FIFTH SEMESTER B.TECH DEGREE EXAMINATION(R&S), DECEMBER 2019**

**Course Code: CE363**

**Course Name: GEOTECHNICAL INVESTIGATION**

Max. Marks: 100

Duration: 3 Hours

**PART A**

*Answer any two full questions, each carries 15 marks.*

Marks

- 1 a) Explain in detail a site investigation programme. (10)  
 b) What is the criteria for fixing the number and spacing of boreholes? (5)
- 2 a) Explain the relevance of significant depth. What is the minimum depth of exploration for square footing and multi-storeyed building? (7)  
 b) With a figure, explain the test procedure for plate load test. (8)
- 3 a) The results of two plate load tests are given in the following table (5)

Plate diameter, B (m)	Total load, Q (kN)	Settlement (mm)
0.305	32.2	20
0.610	71.8	20

A square column footing has to be constructed to carry a total load of 715 kN.

The tolerable settlement is 20 mm. Determine the size of the foundation.

- b) What are the limitations of plate load test? (5)  
 c) Define modulus of subgrade reaction. (5)

**PART B**

*Answer any two full questions, each carries 15 marks.*

- 4 a) Explain the various corrections to be applied for SPT test (10)  
 b) The observed SPT N value in a deposit of fully submerged fine silty sand was 45 (3)  
 at a depth of 6.5 m. The average saturated unit weight of soil is  $19.5 \text{ kN/m}^3$ . Find the corrected SPT number.  
 c) List any two advantages of static cone penetration test. (2)
- 5 a) Give a critical comparison between Standard Penetration test, Static cone penetration test and Dynamic Cone Penetration test. (7)  
 b) What is the significance of pressure meter modulus and limit pressure? Explain (8)

the test procedure for obtaining the same.

- 6 a) With a neat diagram, explain the process of seismic refraction method. (10)  
 b) Differentiate between electrical profiling and electrical sounding method (5)

### PART C

*Answer any two full questions, each carries 20 marks.*

- 7 a) Sketch a piston sampler and explain its working. (10)  
 b) Briefly explain the method of collecting sand samples from beneath the water table. (5)  
 c) During a sampling operation, a thin walled sampler was pushed into soft clay to a distance of 600 mm. The recovered length of the sample was found to be 589 mm. What is the recovery ratio? Also mention the sample quality. (5)
- 8 a) Explain the factors affecting sample disturbance and ways to reduce them. (10)  
 b) Define Rock quality designation and recovery ratio. (5)  
 c) Sketch a typical soil bore log with SPT test data. (5)
- 9 a) Calculate core recovery and rock quality designation from the following borehole core logging data. Core run length=150 cm. (5)

Core recovery (cm)
25
5
5
7.5
10
12.5
7.5
10
15
10
5
12.5

- b) A pile load test is conducted on a 30 cm diameter pile of length 12 m. The results (10)

are given in the table below:

Load in kN	Settlement during loading in cm	Settlement during unloading in cm
0	0	4
500	0.85	4.6
1000	1.65	5.2
1500	2.55	5.5
2000	3.8	5.8
2500	6	6

Plot the graph and determine the allowable load.

(Chart papers should be provided for this question)

- c) What are the contents to be included in a preliminary soil investigation report? (5)

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