

Reg No.: _____

Name.: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
FIFTH SEMESTER B.TECH DEGREE EXAMINATION(S), MAY 2019

Course Code: CE 363

Course Name: GEOTECHNICAL INVESTIGATIONS

Max. Marks: 100

Duration: 3 Hours

PART A

Answer any two full questions, each carries 15 marks.

1)

- a) Why soil exploration is considered important while planning and designing engineering structures? **4 marks**
- b) A loading test was conducted with a 300 mm square plate at a depth of 2 m below the ground surface in a cohesive soil. The water table is located at a depth of 3.5 m below the ground surface

Pressure kN/m ²	50	100	200	300	400	500	600
Settlement, mm	1.5	2.0	4.0	7.5	12.5	20.0	40.0

- i) Plot the pressure-settlement curve and determine the failure stress.
- ii) Determine the size of a square column footing to carry a net load of 2500 kN at 2 m depth. **7 marks**
- c) What should be the major steps involved while planning exploration program of a structure. **4 marks**
- 2)
- a) Using neat sketches explain rotary drilling and its applications. **5 marks**
- b) With necessary sketches, explain how Plate Load Test is conducted for sandy soils if the level of water table is less than 1 m from the level of proposed foundation. **5 marks**
- c) Give the minimum depth of exploration to be carried out for the following cases as per IS specifications.
- i) Isolated spread footing
- ii) Pile foundations
- iii) Road cuts
- iv) Well foundations
- v) Embankment fills **5 marks**

3)

- a) What should be the borehole spacing for the following cases
- i) An industrial complex covering large area
 - ii) A compact building covering an area of 4000 m².
- b) What are the objectives of soil exploration?
- c) State the limitations of Plate Load Test that restrict its application.

4 marks

5 marks

6 marks

PART B

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

4.

- a. An N value of 40 was obtained while conducting SPT in dense sand at a depth of 20m from the surface. If the density of sand deposit is 16kN/m³, find the actual N value corrected for overburden.

5 marks

- b. What are the significant applications of Pressuremeter Tests? Explain the procedure for the test in fine grained soils.

5 marks

- c. Explain the necessity of correcting the N value for Dilatancy.

5 marks

5.

- a. If it is required to find the friction resistance of soil at a given site, which cone penetration test would you recommend? Also explain the procedure of obtaining skin friction and end resistance from that test with suitable sketches.

5 marks

- b. If you are given the velocity of shock-waves in different soils, which geophysical test would you recommend and also explain the procedure. Can it be used to identify the soil profile of an area where there are buried conduits? Explain.

4 marks

- c. Explain the procedure to find the following, using Electrical Resistivity Method

- i. For finding the boundaries of soil within a strata
- ii. For finding changes in a strata with increasing depth

6 marks

6.

- a. Compare the critical advantages of Static Cone Penetration Test over Static Cone Penetration Test. **4 marks**
- b. Data set from a seismic refraction test is given below.

Distance from impact point to geophone (m)	10	20	40	80	140
Time to receive wave (s)	0.025	0.050	0.100	0.110	0.120

- i) Plot the time travel data and determine the seismic velocity for the surface layer and underlying layer. **8 marks**
- ii) Determine the thickness of the upper layer. **8 marks**
- c. Give the advantages and disadvantages of Standard Penetration Test. **3 marks**

PART C

Answer any two full questions, each question carries 20 marks

7.

- a. What are the properties of the sampler which govern whether the collected soil sample is undisturbed or not? **6 marks**
- b. Explain the difference between undisturbed and disturbed samples. **6 marks**
- c. State the procedure for estimation of safe load from vertical compression Pile load Test on single and group piles as per latest revision of IS 2911 . **8 marks**

8.

- a. What are the factors that cause sample disturbances and suggest remedies for preventing the same. **6 marks**
- b. The following data refers to a pile load test carried out on a 500 mm diameter, 10 m long pile.

Load on pile top (kN)	150	200	250	300	400	500	600
Total Settlement of the pile top (mm)	1.45	2.25	2.75	3.60	5.75	10.75	30.00

- Plot the load settlement curve and estimate the ultimate load on the pile **8 marks**
- c. Sketch a borehole log chart. Explain the preparation of a geotechnical investigation report **6 marks**

9.

a. What are representative soil samples? How are they obtained?

6 marks

b. What are the precautions to be followed while handling and transporting soil samples?
Why is it necessary?

6 marks

c. Explain the procedure for separating end bearing and skin friction resistance from pile load tests.

8 marks