Regulation: R18 *Subject Code: 2P4AE*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A' Grade)

B.Tech IV Semester Supplementary Examinations, July 2022

SOIL MECHANICS

(Civil Engineering)

Maximum Marks: 70 Date:30.07.2022 **Duration: 3 hours**

Note: **1.This question paper contains two parts A and B.**
2. Part A is compulsory which carries 20 marks. Answer all questions in Part A.
3. Part B consists of 5 Units. Answer any one full question from each unit.
4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A

All the following questions carry equal marks (10x2M = 20 Marks)

1 Define void ratio, porosity and derive relation between "e" and "n".
2 Define Shrinkage Ratio.
3 Define Permeability.
4 Define seepage velocity or) Actual velocity.
5 Write down the Westergaard's equation for the vertical stress for a point load?
6 Define compaction.
7 What is primary consolidation?
8 Define expansion index.
9 What is liquefaction of sands?
10 What is critical void ratio?

Part-B

Answer All the following questions. (5x10M = 50 Marks)

11 In a compaction test on a soil, the mass of wet soil when compacted in the mould was 1.855 kg. the water content of the soil was 16%. If the volume of the mould was 0.945 liters, determine the dry density, void ratio, degree of saturation and percentage air voids. Take G = 2.68. [10]

OR

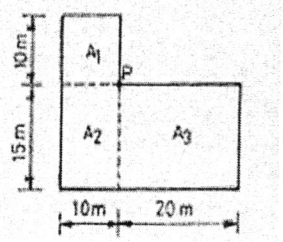
12 What is the use of classification of soils? Discuss Indian standard classification system. [10]

13 A sand deposit is 10m thick and overlies a bed of soft clay. The ground water table is 3m below the ground surface. If the sand above the ground water table has a degree of saturation of 45%, plot the diagram showing the variation of the total stress, pore water pressure and the effective stress. The void ratio of the sand is 0.70. Take G = 2.65. [10]

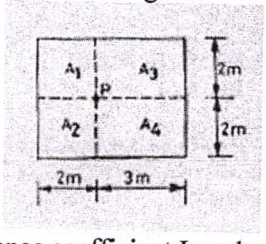
OR

14 Explain constant head permeability test and falling head permeability tests for the determination the co-efficient of permeability. [10]

15 a) An L-shaped building in plan shown in figure exerts a pressure of 75 KN/m^2 on the soil. Determine the vertical stress increment at a depth of 5m below the interior corner P. [5]



b) A rectangular foundation 4mx5m carries a uniformly distributed load of 200 Kn/m^2. Determine the vertical stress at a point P located as shown in figure and at a depth of 2.5m. [5]



Influence coefficient I_N values are

m	n		
	0.8	2	3
1	0.1461	0.1812	0.1841
2	0.1598	0.1999	0.2034
3	0.1812	0.2325	0.2378
4	0.1841	0.2378	0.2439
5	0.1849	0.2395	0.2461

OR

16 Discuss the basis of the construction of Newmark's influence chart. How is it used? [10]

17 a) Differentiate between normally consolidated and the over consolidated soils. How would you determine the over-consolidation pressure? [5]

b) The laboratory consolidation data for an undisturbed clay sample are as follows. $E_1 = 1.00$, $\bar{\sigma}_1 = 85$ KN/m^2, and $e_2 = 0.80$, $\bar{\sigma}_2 = 465$ KN/m^2.

Determine the void ratio for a pressure $\bar{\sigma}_3$ of 600 KN/m^2. [5]

OR

18 What is primary consolidation? Discuss the spring analogy for primary consolidation. What are its uses? [10]

19 The stresses on a failure plane in a drained test on a cohesionless soil are as under: [10]

Normal stress (σ)=100 kN/m^2

Shear stress (τ)= 40 kN/m^2

a) Determine the angle of shearing resistance and the angle which the failure plane makes with the major principal plane.

b) Find the major and minor principal stresses.

OR

20 Explain in detail the determination of shear strength using direct shear test. [10]