R20 Regulation *Subject code: 3P5AD*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech V Semester Regular/Supplementary Examinations, Feb-2024

Soil Mechanics

(Civil Engineering)

Maximum Marks: 70 Date: 22.02.2024 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 which carries 10M.
4. Each question carries 10 marks and may have a, b, c, d as sub questions.

	Part-A	CO	Bloom Tx
All the following questions carry equal marks (10x2M=20 Marks)			
1	Name some soils that are generally used in practice.	CO1	L1
2	What are all the Atterberg limits for soil and why it is necessary?	CO1	L2
3	Give the properties of flow net.	CO2	L1
4	A soil deposit consists of three layers of thickness 4 m, 1 m and 2 m. The respective coefficients of permeability are 3 x 10^{-2} mm/sec, 3 x 10^{-5} mm/sec, 4 x 10^{-2} mm/sec. Find the coefficient of permeability in the horizontal and vertical directions.	CO2	L3
5	Mention the assumptions made in Boussinesq's formula for point loads.	CO2	L1
6	Write down the aim of compaction.	CO3	L1
7	Define Degree of consolidation.	CO3	L1
8	Compare normally consolidated clays and over consolidated clays.	CO3	L2
9	Define Dilantency and Sensitivity.	CO4	L1
10	What are the various laboratory methods to determine shear strength of the soils?	CO4	L1
	Part-B		
Answer All the following questions. (5X10M=50Marks)			Bloom Tx level
11	A. Find the maximum possible voids ratio for a uniformly graded sand of perfectly spherical grains. (3) B. A sample of wet silt clay soil has a mass of 126 kg. Weight density = 2.1 g/cm^3, G = 2.7 and water content = 15%. Determine (i) dry density; (ii) porosity (iii) void ratio and (iv) degree of saturation. (7)	CO1	L3
	OR		
12	A. Explain in detail the procedure for determination of grain size distribution of soil by sieve analysis. (7) B. Give a brief note on the unified soil classification system. (3)	CO2	L2
13	Describe in detail the laboratory determination of permeability using constant head method and falling head method. (10)	CO1	L2
	OR		
14	The water table in a deposit of sand 8 m thick is at a depth of 3 m below the ground surface. Above the water table, the sand is saturated with capillary water. The bulk density of sand is 20 kN/m^3. Calculate the effective pressure	CO2	L4

	at 1 m, 3 m and 8 m below the ground surface. Hence plot the variation of total pressure, neutral pressure and effective pressure over the depth of 8 m. (10)		
15	A concentrated load of 220 kN act at a foundation level at a depth of 2 m below the ground surface. Find the vertical stress along the axis of the load at a depth of 10 m and at a radial distance of 16.4 feet at the same depth by (a) Boussinesq formula (b) Westergaard formula for $\mu = 0$. Neglect the depth of foundation. (10)	CO3	L4
	OR		
16	Describe the various equipment used for field compaction. (10)	CO2	L2
17	A 6 m thick bed of clay is overlain by 9 m thick layer of sand with water table at 4 m below ground surface. The initial void ratio of the clay layer is 1.08 and the compression index is 0.315. For the sand layer, the bulk unit weights above and below water table are 18 kN/m^3 and 20 kN/m^3 respectively. Calculate the settlement of a building constructed on sand layer if it causes an increase in effective vertical stress of 100 kN/m^2 at the middle of clay layer. (10)	CO3	L5
	OR		
18	Discuss the Terzaghi's theory of one dimensional consolidation with a neat sketch. (10)	CO3	L3
19	What is the shearing strength of soil along a plane at a depth of 4 m in a deposit of sand having the following properties? Angle of internal friction, $\phi = 35°$ Dry unit weight, $\gamma_d = 18$ kN/m^3 Specific gravity, $G = 2.6$ Assume the ground water table is at a depth of 3 m from the ground surface. Also find the change in shear strength when the water table rises to the ground surface. (10)	CO4	L5
	OR		
20	Describe the triaxial shear test. What are the advantages of triaxial shear test over the direct shear test? (10)	CO4	L2