R18 Regulation *Subject code:2P4AE*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech IV Semester Supplementary Examinations, December 2024

SOIL MECHANICS

(Civil Engineering)

Maximum Marks: 70 Date:12.12.2024 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		
All the following questions carry equal marks (10X2M=20) Marks)		CO	Bloom Tx
1	Define void ratio.	1	L1
2	Define Shrinkage Ratio.	1	L1
3	What is a flow net?	2	L1
4	Define seepage velocity.	2	L1
5	Write down the Westergaard's equation for the vertical stress for a point load?	3	L1
6	Define compaction.	3	L1
7	Define compression index.	4	L1
8	What is secondary consolidation of soils?	4	L1
9	What is shear strength of soil?	5	L1
10	State the principles of direct shear test?	5	L1
	Part-B		
Answer All the following questions. (5X10M=50Marks)		CO	Bloom Tx
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. [10M]	1	L2
	OR		
12	A) Show that the degree of saturation can be expressed as [5M] $$Sr = \frac{w}{\frac{\gamma_w}{\gamma}(1+w) - \frac{1}{G}}$$ B) Prove that the water content (w) of a partially saturated soil can be expressed as $$w = \frac{1-(G_m/G)}{(G_m/S)-1}$$ Where G_m= mass specific gravity, G= specific gravity of solids and S= degree of saturation. [5M]	1	L2

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. [10M]	2	L2
	OR		
14	Explain the mechanics of piping in hydraulic structures. What methods are used to increase the factor of safety against piping? [10M]	2	L2
15	A) Derive an expression for the vertical stress at a point due to a point load, using Boussinesq's theory. [5M] B) A concentrated load of 2000kN is applied at the ground surface. Determine the vertical stress at a point P which is 6m directly below the load. Also calculate the vertical stress at a point R which is at a depth of 6m but at a horizontal distance of 5m from the axis of the load. [5M]	3	L2
	OR		
16	Write about factors effecting compaction and list out field compaction equipment [10M]	3	L2
17	How would you determine the time-settlement curve in the field? [10M]	4	L2
	OR		
18	Describe the consolidometer test. Show how the results of this test are used to predict the rate of settlement and the magnitude of settlement. [10M]	4	L2
19	Explain in detail the determination of shear strength using unconfined compression test. [10M]	5	L2
	OR		
20	Describe the triaxial shear test. What are the advantages of triaxial shear test over the direct shear test? [10M]	5	L2