



B.Tech IV Semester Supplementary Examinations, July 2024

SOIL MECHANICS
(CE)

Maximum Marks: 70

Date: 27.07.2024 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, porosity.		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	What is the effect of pore pressure on shear strength of soil?		5	L1

Part-B

Answer All the following questions.		(5X10M=50Marks)		
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] $S = \frac{w}{\frac{\gamma_w}{\gamma}(1+w) - \frac{1}{G}}$ 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	Derive an expression for the vertical stress at a point due to a point load, using Boussinesq's theory. [10M]	3	L2
OR			
16	A sample of soil was prepared by mixing a quantity of dry soil with 10% by mass of water. Find the mass of this wet mixture required to produce a cylindrical, compacted specimen of 15cm diameter and 12.5cm deep and having 6% air content. Find also the void ratio and the dry density of the specimen if $G = 2.68$. [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	a) Explain Mohr-Coulomb theory [5M] b) Write revised Mohr-Coulomb equation. How does it differ from the original equation? [5M]	5	L2
OR			
20	Explain in detail the determination of shear strength using direct shear test. [10M]	5	L2