

THE KAVERY ENGINEERING COLLEGE
(An Autonomous Institution)

B.E/B.TECH DEGREE END SEMESTER THEORY EXAMINATIONS, NOV /DEC 2024

Fourth Semester

Civil Engineering

CE3404–Soil Mechanics

Regulations – 2021

Duration : 3 Hrs

Maximum : 100 Marks

PART – A(ANSWER ALL QUESTIONS) (Marks 10*2=20)

<i>Q.No</i>	<i>Questions</i>	<i>BLT</i>	<i>CO</i>	<i>Marks</i>
1.	How do you determine plasticity index of soil?	UN	1	2
2.	A soil has bulk density of 30 kN/m ³ and water content is 15%. Find dry density of soil.	UN	1	2
3.	State Darcy's law.	RE	2	2
4.	Enlist the factors affecting permeability of the soil.	RE	2	2
5.	Determine the time factor if the degree of consolidation is 85%.	UN	3	2
6.	Recall the components of settlement.	RE	3	2
7.	Write a short note on Mohr Coulomb theory.	UN	4	2
8.	Determine the cohesion and shear strength if unconfined compressive strength of the soil is 140 kg/cm ³ .	UN	4	2
9.	Differentiate finite and infinite slope.	RE	5	2
10.	Define slope stability number.	RE	5	2

PART – B (ANSWER ALL QUESTIONS) (Marks 5*13 = 65)

<i>Q.No</i>	<i>Questions</i>	<i>BLT</i>	<i>CO</i>	<i>Marks</i>
11.	a The mass of wet soil when compacted in a mould was 30 kN. The water content of soil was 15 %. If the volume of mould was 1100 cc, determine: i) Dry unit weight ii) Void ratio iii) Degree of saturation iv) Percent air voids. Take $G = 2.68$ Or b A soil sample has a porosity of 35%. The specific gravity of solids is 2.70. Calculate, i) Void ratio ii) Dry density iii) Unit weight of soil if 50% saturated iv) Unit weight of soil if completely saturated	AN	1	13
12.	a Compute the total pressure, effective pressure and pore water pressure at a depth of 18 m below the bottom of a lake 8 m deep. The bottom of lake consists of soft clay with a thickness of more than 20 m. The average water content of the clay is 35% and specific gravity of the soil may be assumed to be 2.65.	AN	2	13

Or

	b	Illustrate the laboratory experiment to determine coefficient of permeability for course grained soil with neat sketch. Also derive the suitable governing equation.	UN	2	13
13.	a	A water tank is supported by a ring foundation having outer diameter of 12 m and inner diameter of 8.5 m. The ring foundation transmits a uniform load intensity of 150 kN/m ² . Compute the vertical stress induced at the depth of 4 m below the centre of the ring foundation, using Boussinesq theory.	AN	3	13
		Or			
	b	In a consolidation test, the void ratio of the specimen which was 1.05 under the effective pressure of 224 kN/m ² , changed to 0.995 when the pressure was increased to 445 kN/m ² . Calculate the I) Coefficient of compressibility II) Compression index III) Co-efficient of volume change	AN	3	13
14.	a	A vane shear 8 cm in diameter and 12 cm in length was used to measure shear strength of the clay. If torque of 550 Nm was required in natural state and 1125 Nm in remoulded state, determine shear strength in both the cases.	AN	4	13
		Or			
	b	Explain in detail how shear strength of soil is determined by unconfined compressive strength with neat sketch.	UN	4	13
15.	a	Elucidate the procedure for determining the factor of safety of a given slope by friction circle method.	AP	5	13
		Or			
	b	In a sloping terrain, it was found that the soil is clayey and weak in nature, suggest any four slope protection methods to stabilize the slope.	AP	5	13

*PART – C (Marks 1*15 = 15)*

Q.No		Questions	BLT	CO	Marks
16.	a	The following data were obtained in a direct shear test. Normal pressure = 30 kN/m ² , Tangential pressure = 25 kN/m ² , Angle of internal friction = 20°. Cohesion = 9 N/m ² Represent the data by Mohr's Circle and compute the principal stresses and the direction of principal planes.	AN	4	15
		Or			
	b	A saturated soil has a compression index of 0.3. Its void ratio at the stress of 12 kN/m ² is 2 and its permeability is 4.5 x 10 ⁻⁷ mm/sec. Compute; i) Change in void ratio if the stress is increased to 30 kN/m ² ii) Settlement if the soil stratum is 5 m thick and iii) Time required for 40% consolidation drainage is one way.	AN	3	15