Course Code: 23CE5T03

BONAM VENKATA CHALAMAYYA INSTITUTE OF TECHNOLOGY & SCIENCE

(AUTONOMOUS)

III - B.Tech I-Semester Supplementary Examinations (BR23), Mar/Apr - 2026

GEO-TECHNICAL ENGINEERING-I (CE)

Time: 3 hours Max. Marks: 70

Question Paper consists of Part-A and Part-B
*Answer **ALL** the question in **Part-A and Part-B***

PART–A (10X2 = 20M)

		Marks	CO	BL
1. a)	Explain the honey comb soil structure.	(2M)	CO1	BL1
b)	What are the various sieve sizes?	(2M)	CO1	BL2
c)	State Darcy's law.	(2M)	CO2	BL1
d)	Write down the equation to determine coefficient of permeability by Variable head test.	(2M)	CO2	BL2
e)	Mention any four assumptions of Boussinesq's theory	(2M)	CO3	BL1
f)	State any two uses s influence chart.	(2M)	CO3	BL3
g)	Discuss Terzaghi's theory of consolidation, stating the various assumptions and their validity	(2M)	CO4	BL2
h)	State any three assumptions of Westergaard's theory.	(2M)	CO4	BL1
i)	Explain how soil derives shear strength	(2M)	CO5	BL3
j)	List out any three demerits of direct shear test.	(2M)	CO5	BL2

PART–B (5X10 = 50M)

2a.	Establish a relation between the specific gravity of solids(G), void ratio(e), degree of saturation(S), unit weight of water(γ_w) and bulk unit weight of soil (γ). A loose uncompacted sand fill has a relative density of 40%. Laboratory tests indicated that the Minimum and maximum void ratios of sand are 0.56 and 0.9 respectively. Specific gravity is 2.65. What is the field dry unit weight of sand?	5 (M)	CO1	BL1
b.	Write short notes on the determination of shrinkage limit test.	5 (M)		
	(OR)			
3a.	What are the index properties? Name the Index properties of cohesionless soils and cohesive soils.	5 (M)	CO1	BL2
b.	A loose uncompacted sand fill has a relative density of 40%. Laboratory tests indicated that the Minimum and maximum void ratios of sand are 0.56 and 0.9 respectively. Specific gravity is 2.65. What is the field dry unit weight of sand?	5 (M)		
4a.	Explain procedure for determining coefficient of permeability of soil, by Falling head permeameter.	5 (M)	CO2	BL3
b.	A 5m thick layer of saturated clay is overlain by sand 4m deep. The water table is 3m below ground surface. The saturated unit weights of clay and sand are 22kN/m³ and 20kN/m³ respectively. The unit weight of sand above water table is 17kN/m³. Find the total and effective stress at the top and middle of clay layer.	5 (M)		
	(OR)			

5a.	Explain about various factors affecting Co-efficient of permeability.	5 (M)	CO2	BL2
b.	In a flow net for a sheet pile wall, the number of flow paths is 5 and the number of equipotential drops is 10. Determine the seepage under the wall in liters per day, if the k = 6 × 10-3 mm/s and head = 4.5 m	5 (M)		
6a.	What is quicksand condition? Derive the expression for the critical hydraulic gradient	10(M)	CO3	BL1
	(OR)			
7a.	Differentiate between Boussinesq's and Westergaard's theory.	5(M)	CO3	BL2
b.	What are the characteristics and uses of flow nets?	5(M)		
8a.	Write short notes on the Log fitting method for evaluation of Cv from laboratory consolidation test	5 (M)	CO4	BL2
b.	Determine the amount of settlement, given the following data: Thickness of compressible medium = 3 m Coefficient of volume decrease = 0.002 cm2 /N Pressure increment at the centre of the compressible medium = 75 kN/m2 .	5 (M)		
	(OR)			
9a.	Explain the factors affecting Compaction.	5 (M)	CO4	BL3
b.	In a consolidation test, a fully saturated clay sample was subjected to a load of 500 kPa. After 12 hours, the average pore water pressure was found to be 200 kPa. Find out the time required for 50% consolidation to take place. Assume $T_V = \pi U^2/4$	5 (M)		
10a.	Draw the Mohr-Coulomb failure envelopes of C_U, C_D and U_U tests sandy soils and comment on shear strength parameters.	10(M)	CO5	BL1
	(OR)			
11a	Define the Critical void ratio. Compare the behaviour of dense sands with that of loose sands under shearing conditions	5 (M)	CO5	BL2
b.	A consolidated drained tri-axial test was conducted on normally consolidated clay. The results were as follows: $\sigma 3$ = 300 kN/m2 ; deviator stress, $\Delta\sigma df$ = 350 kN/m2 . Determine (a) the angle of internal friction, Φ (b) angle θ that the failure plane makes with the major principal plane. (c) Normal stress, τ_f , on the failure plane.	5 (M)		

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