Register Number:……..

KUMARAGURU
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B.E DEGREE EXAMINATIONS: APRIL / MAY 2023

(Regulation 2018)

Fifth Semester

CIVIL ENGINEERING

U18CEI5202: Soil Mechanics

COURSE OUTCOMES

CO1: Identify and classify soils as per Bureau of Indian Standards (BIS)
CO2: Estimate effective stress and vertical stress of soil below ground level
CO3: Determine permeability, and seepage through soil and prepare flow net diagram
CO4: Understand compaction, compressibility parameters and estimate the total, time rate settlement of soil.
CO5: Analyze shear properties of cohesive and cohesionless soils

Time: Three Hours **Maximum Marks: 100**

Answer all the Questions:-
PART A (10 x 2 = 20 Marks)
(Answer not more than 40 words)

1.	The bulk and dry densities of a soil are 20 kN/m^3 and 18 kN/m^3 respectively. What value will you consider for constructing a highway embankment?	CO1	[K_3]
2.	What is clay? Mention its top two most important properties.	CO1	[K_2]
3.	What is a pressure bulb?	CO2	[K_2]
4.	Calculate the total stress at the bottom of a lake having 10.0 m of water. Consider unit weight of water as 9.81 kN/m^3.	CO2	[K_3]
5.	Define coefficient of permeability of soil.	CO3	[K_2]
6.	What are the applications of flow net?	CO3	[K_2]
7.	Differentiate between compaction and consolidation.	CO4	[K_2]
8.	What are field tests to be performed to ascertain the quality check of construction of embankments.	CO4	[K_1]
9.	Calculate the centre and radius of Mohr's circle having σ_1 and σ_3 values 40 kPa and 20 kPa respectively.	CO5	[K_2]
10.	Differentiate between unconsolidated undrained and consolidated drained triaxial shear tests.	CO5	[K_2]

Answer any FIVE Questions:-
PART B (5 x 16 = 80 Marks)
(Answer not more than 400 words)

11.	a)	Define consistency and consistency limits of soil. What are the types of it?	4	CO1	[K_2]
	b)	Explain the laboratory procedure to estimate the liquid limit of a soil.	12	CO1	[K_2]

12.	a)	The water table in a deposit of sand 8 m thick, is at a depth of 3 m below the surface. Unit weight of sand above and below water table is 17.50 kN/m^3 and 19.50 kN/m^3 respectively. Calculate the effective pressure at 1 m, 3 m and 8 m below the surface and hence plot the variation of total, neutral and effective pressure over the depth of 8 m. Consider unit weight of water as 10.0 kN/m^3.	12	CO2	[K_3]
	b)	State the assumptions made in deriving Boussinesq's theory.	4	CO2	[K_2]
13.	a)	Explain in detail how to estimate coefficient of permeability of coarse-grained soil in the laboratory.	10	CO3	[K_2]
	b)	The water level in the upstream and downstream side of the dam is 20 m and 2 m respectively with respect to bed level. The number of flow lines and equipotential lines are 4 and 6. Compute the quantity of seepage for the soil having coefficient of permeability k = 5 x 10^{-4} cm/s.	6	CO3	[K_3]
14.	a)	Explain in detail, how to estimate maximum dry density (MDD) and optimum moisture content (OMC) of a soil in the laboratory.	12	CO4	[K_2]
	b)	State the assumptions made in Terzaghi's one dimensional consolidation theory.	4	CO4	[K_2]
15.	a)	State the difference between uniaxial and triaxial shear test. What are the types of triaxial shear test performed in the laboratory? Explain in brief.	4	CO5	[K_2]
	b)	Explain in detail how to estimate shear strength parameters of soil in the laboratory, by conducting direct shear test.	12	CO5	[K_2]
16.	a)	How soil is formed in nature and what are the types of it?	8	CO1	[K_2]
	b)	List the characteristics of flow net.	8	CO3	[K_2]

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