SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUTTUR
(AUTONOMOUS)
B.Tech II Year II Semester Regular & Supplementary Examinations August-2023
GEOTECHNICAL ENGINEERING
(Civil Engineering)

Time: 3 Hours   **Max. Marks: 60**

(Answer all Five Units **5 x 12 = 60** Marks)

UNIT-I

1	a	Define the terms: (i) Liquidity index (ii) Flow index (iii) Toughness index (iv) Activity	CO1	L1	6M
	b	Determine the average coefficient of permeability in the horizontal and vertical direction for a deposit consisting of three layers of thickness 5m, 1m, and 2.5m and having the coefficient of permeability of 3×10^{-2} mm/sec, 3×10^{-5} mm/sec and 4×10^{-2} mm/sec respectively.	CO2	L4	6M

OR

2	a	The mass of a moist sample collected from the field is 645 g, and its oven dry mass is 505 g. If G = 2.68 and the void ratio of the soil in the field is 0.83, determine (i) moist density in the field, (ii) dry density in the field, (iii) degree of saturation, and (iv) saturated density.	CO1	L2	6M
	b	What is effective stress? Explain the importance of effective stress in geotechnical engineering.	CO2	L2	6M

UNIT-II

3		For constructing an embankment, the soil is transported from a Borrow area using a truck which can carry 6 m^3 of soil at a time. With the following details, determine the number of truckloads of soil required to obtain 100 m^3 of compacted earth fill and the volume of borrow pit	CO3	L4	12M

Property	Borrow area (In-situ)	Truck (Loose)	Field (Compacted)
Bulk Unit Weight (kN/m³)	16.6	11.5	18.2
Water Content (%)	14	8	6

OR

4	a	What is consolidation? Describe briefly various types of consolidation of soils.	CO3	L2	6M
	b	In a consolidation test the following results have been obtained. When the load was changed from 50 KN/m² to 100 KN/m², the void ratio changed from 0.70 to 0.65. Determine compression index, coefficient of volume change and coefficient of consolidation in mm² /sec.	CO3	L4	6M

UNIT-III

5	a	A circular ring footing for an overhead water tank carries a load of 1000 kN whose outer diameter is 3 m and inner diameter is 1.5 m. Determine the induced stress at a depth of 3 m from surface below the centre of the loaded area.	CO4	L4	6M
	b	What are the various methods of determination of shear strength in the laboratory?	CO4	L2	6M

OR

6	a	A water tank is supported by a ring foundation having outer diameter of 10 m and inner diameter of 7.5 m. The ring foundation transmits uniform load intensity of 160 kN/m² . Compute the vertical stress induced at depth of 4 m, below the centre of ring foundation.	CO4	L3	6M
	b	Explain types of shear strength based on drainage conditions.	CO4	L2	6M

7	a	Explain Taylor's stability number.		CO5	L2	6M
	b	A vertical cut is made is made in a clay deposit (c=30 kN/m^2 , $\Phi' = 0^0$,γ=16 kN/m2). Find the maximum height which can be temporarily supported. Take Sn=0.261		CO5	L3	6M

OR

8	A canal is to be excavated through a soil with c = 15 kN/m^2 , $\Phi = 20^0$, e = 0.9 and G = 2.67. The side slope is 1 in 1. The depth of the canal is 6 m. determine the factor of safety with respect to cohesion when the canal runs full. What will be the factor of safety if the canal is rapidly emptied?	CO5	L3	12M

9	Give a detailed account on how Standard Penetration Test is conducted. What are the relevant corrections applied to SPT number?	CO6	L2	12M

OR

10	a	What are the different stages in sub soil exploration?	CO6	L1	6M
	b	How boring operations are carried out using rotary auger boring and drilling?	CO6	L2	6M

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