TE (CIVIL) Sem VI R'19 C-scheme
20-05-2025

Time: 3 Hours **Marks :80**

N. B.: (1) Question No. 1 is compulsory.
(2) Attempt any three from the remaining five questions.
(3) Figures to the right indicate the full marks.
(4) Assume suitable data if not given and justify the same.

			Marks
Q. 1.		Attempt any four	
	A.	Explain the primary consolidation by the spring analogy method.	5
	B.	What are the assumptions of Rankine's Theory for lateral earth pressure?	5
	C.	Discuss the factors influencing the bearing capacity of soil.	5
	D.	Explain the Dynamic Formulae for analyzing the load carrying capacity of Piles.	5
	E	Explain Taylor's stability Number to analyze the stability of slopes.	5
	F	Explain the liquefaction of soil.	5
Q.2.	A.	A triaxial compression test on a cohesive sample cylindrical in shape, yields the following effective stresses. Major Principal stress is 9MN/m^2, Minor Principal stress is 3MN/m^2 Angle of inclination of the rupture plane is 60° to the horizontal. Present the above data using a Mohr's Circle of stress diagram. Find the angle of internal friction.	10
	B.	A layer of soft clay is 3 m thick and lies under a newly constructed building. The weight of sand overlying the clayey layer produces a pressure of 250 kN/m^2 and the new construction increases the pressure by 120 kN/m^2. If the compression index is 0.44, compute the settlement. Water content is 38 % and specific gravity of grains is 2.67	10
Q.3.	A.	A square column foundation is to be designed for a gross allowable total load of 350 KN. If the load is inclined at an angle of 10° to the vertical, determine the width of the foundation. Take factor of safety of 3.0 and use IS Code Method. γ=20KN/m^3 , ϕ =33°, C= 26 KN/m^2 .The depth of the foundation is 1 m. (Nc = 47, Nq=34, Nγ=48.03)	10
	B.	Explain the procedure of Pile Load Test. How is the allowable load calculated as per IS recommendations?	5
	C.	Compare Rankine's and Coulombs lateral earth pressure theory.	5

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Q.4. A. A deep cut of 10m depth is made in natural soil for the construction of a road. The properties of soil are: C =25 KN/m^2, ϕ =20°, γ=20 KN/m^3. The slope angle of the cut is 320. Consider a trial slip circle of radius 18 m passing through the toe and cutting the top ground surface at a distance of 6m from the top edge. Determine the factor of safety with respect to cohesion for the given slip circle by the Friction Circle Method. Assume a factor of safety as 1.8. 10

B. A retaining wall 12m high retains sand with ϕ = 32° and γ = 22 kN/m^3 upto a depth of 6m from the top. From 7 to 12m, the material is a cohesive soil with having C=30 KN/m^2 and, ϕ = 25° and γ = 20 kN/m^3. The water table is at a depth of 6 m from the ground level. γsat=22 kN/m^3 for cohesive soil. Find the total active thrust on the wall along with its point of application. A retaining wall also carries a uniform surcharge of 50 KN/m^2 on the top of soil. 10

Q. 5 A. Determine load carrying capacity of piles having following properties . 10
Diameter of pile =0.4m, Length of pile = 15 m , γ_d = 16 KN /m^3 , γ_{sat} = 19 KN/m^3 .
K tan δ= 1.5, critical depth of pile as 7.5 times diameter of pile, Nq = 70. Properties of clay is γ_{sat} = 20 KN /m^3. Soil deposit consists of sand of 20m thick followed by 4 m thick clay layer. The Ground water level is observed at 2m from ground surface.

B. Define Initial consolidation, Primary consolidation and Secondary consolidation. 5

C. Discuss the difference between general shear failure , local shear failure and punching shear failure with neat sketch. 5

Q. 6 A. Explain with a diagram Rehbann's Graphical Method for the determination of active earth pressure for cohesionless soil backfill. 10

B. A strip footing is to be designed to carry a load of 900 kN/m at a depth of 1m. The effective shear parameters are C=0, ϕ = 40° . Find the minimum width of footing . Assume that the water table raises to ground level. γ=18 kN/m^3 and γsat=20 kN/m^3.For ϕ = 40° N_q =64, N_γ =95. Use Terzaghi's Bearing capacity theory. 10