

END TERM EXAMINATION**FIFTH SEMESTER [B. TECH] NOVEMBER-DECEMBER 2018****Paper Code: ETCE-309****Subject: Geotechnical & Foundation Engg.****Time: 3 Hours****Maximum Marks: 75****Note: Attempt any five questions including Q. No. 1 which is compulsory.**

- Q1 Write short note on following: (2.5x10=25)
- Undisturbed samples.
 - Ultimate bearing capacity of soil.
 - Geomembranes.
 - Braced cuts.
 - Base Failure.
 - Permissible limits of total and differential settlement.
 - Weep holes in retaining walls.
 - Grouting and Injection.
 - Area ratio in exploration of soil.
 - Environmental cycle.
- Q2 What are the purposes of geotechnical exploration? Also, explain the significance of terms area ratio, inside clearance and outside clearance with respect to undisturbed samples of soil. (12.5)
- Q3 A strip footing is to be designed to carry a gross load of 900kN/m at a depth of 1m in a gravelly sand. The appropriate shear strength parameter $c=0$ and $\phi=38^\circ$. Determine the width of the footing if a factor of safety of 3 against shear failure is to be assured. Water table is found to be at foundation level. Above the water table, the saturated unit weight is 18kN/m³ and below the water table, the saturated unit weight is 20kN/m³. For $\phi=38^\circ$, the bearing capacity factors are: $N_q=49$ and $N_\gamma=67$. Unit weight of water is 9.8kN/m³. (12.5)
- Q4
- What are under reamed piles? Explain their uses. (6)
 - A singly-reamed, 8m long RCC pile with 350mm shaft diameter and 750 bulb diameter installed at a depth 500mm from the ground surface within stiff, saturated silty clay (undrained shear strength is 50kPa, adhesion factor is 0.3 and the applicable bearing capacity factor is 9) to counteract the impact of soil swelling on a structure constructed above. Neglecting suction and the contribution of the under-ream to the adhesive shaft capacity, what would be the estimated ultimate load carrying capacity of the pile? (6.5)
- Q5
- What is active and passive pressure on the retaining wall? Drive an expression for the active pressure on the wall as per Rankine? (6.5)
 - A 4m high retaining wall supports a saturated cohesive soil ($\phi=0$) with horizontal surface. The top 2.5m of the backfill has the bulk density and apparent cohesion of the bottom 1.5m is 19.5kN/m³ and 20.3kN/m³ respectively. If the tension crack develops, what would be the total active pressure on the wall? (6)
- Q6
- Differentiate between finite and infinite slopes? With diagram. (6)
 - An infinitely long slope is made up of $c-\phi$ soil having cohesion=20kPa and dry unit weight=16kN/m³. The angle of inclination and critical height of slope are 40° and 5m respectively. What will be the angle of internal friction of the soil to maintain the limiting equilibrium? <https://www.ggsipuonline.com> (6.5)
- Q7 What are caissons? Explain the various types of caissons along with their uses? (12.5)
- Q8 The number of blows observed in a standard penetration test for 0-150mm, 150-300mm and 300-450mm penetration of sampler are 6, 8 and 10 respectively. The water table is at the ground surface. Test is performed at a depth of 10m below the ground surface. The unit weight of soil is 16kN/m³. What will be the N-value after all corrections? (12.5)