



B.Tech - Odd Sem : End Semester Exam
Academic Year:2020-2021
18CE3104 - Foundation Engineering
Set No: 4

Time:		Max.Marks: 100					
S.NO	Answer All Questions	Choice	Options	Marks	CO	CO BTL	COI BTL
1.	A continuous footing of width 2.5m rests 1.5m below and ground surface in clay. The unconfined compressive strength of the clay is 150 kN/m ² . Calculate the ultimate bearing capacity of the footing, when there is no effect of water table and when water reaches ground surface. Take $\gamma = 18 \text{ kN/m}^3$, $\gamma_{\text{sat}} = 20 \text{ kN/m}^3$	choice Q-2		10Marks	CO1	4	3
2.	A 3 m square footing is in a dense sand at a depth of 2 m. Determine the ultimate bearing capacity for the following water table positions : The moist unit weight of sand above the water table is 18 kN/m ³ and the saturated unit weight is 20 kN/m ³ , angle of internal friction = 35 degrees. Take $\gamma = 10 \text{ kN/m}^3$. a) At a ground surface b) At footing level c) At 1 m below the footing d) At 1 m below the ground level			10Marks	CO1	4	3
3.	ANSWER ALL QUESTIONS	choice Q-4		15Marks	CO1	4	4
3.A.	Illustrate the method of determination of bearing capacity of granular soils based on SPT.			5Marks	CO1	4	2
3.B.	Discuss the various factors influencing the bearing capacity of a footing on (a) a cohesion less soil and (b) a purely cohesive soil.			10Marks	CO1	4	3
4.	ANSWER ALL QUESTIONS			15Marks	CO1	4	4
4.A.	Bring out clearly the effect of ground water table on the safe bearing capacity			5Marks	CO1	4	2
4.B.	Determine the safe bearing capacity of a square footing 2.1 m X 2.1 m placed at a depth of 1.5 m in a soil with a moist unit weight of 17.5 kN/m ³ , $c = 15 \text{ kPa}$ and $\phi = 20$ degrees. Take $N_c = 11.8$, $N_q = 3.9$ and $N_\gamma = 1.7$. What is the change in safe bearing capacity if the water table rises to 0.5 m above footing base if $F = 3$?			10Marks	CO1	4	4
5.	A bored pile in a clayey soil failed at an ultimate load of 400 kN. If the pile is 40 cm diameter and 10 m long, determine the capacity of a group of nine piles, spaced 1 m center to center both ways. Take $\alpha = 0.5$	choice Q-6		10Marks	CO2	4	3
6.	A 12m long, 300mm diameter pile is driven in a uniform deposit of sand having angle of internal friction = 40 degrees. The water table is at a great depth and is not likely to rise. The average dry unit weight of sand is 18 kN/m ³ , using $N_q = 137$, calculate the safe load capacity of the pile with a factor of safety of 2.5.			10Marks	CO2	4	3
7.	ANSWER ALL QUESTIONS	choice Q-8		15Marks	CO2	4	4
7.A.	Explaining about negative skin friction of pile foundation.?			5Marks	CO2	4	2
7.B.	A square group of 9 piles was driven into soft clay extending to a large depth. The diameter and length of the piles were 30 cm and 9 m respectively. If the unconfined compression strength of the clay is 90 kN/m ² , and the pile spacing is 90 cm centre to centre. What is the capacity of the group? Assume a factor of safety of 2.5 and adhesion factor of 0.75			10Marks	CO2	4	4
8.	ANSWER ALL QUESTIONS			15Marks	CO2	4	4
8.A.	List the factors influencing the selection of pile			5Marks	CO2	4	2
8.B.	Discuss various dynamic formulae? What are their limitations?			10Marks	CO2	4	3
9.	A rectangular footing (3 m x 2 m) exerts a pressure of 100 kN/m ² on a cohesive soil (E value of $5 \times 10^4 \text{ kN/m}^2$ and $\mu = 0.5$). Determine the elastic settlement at the Centre and Corners. Assuming the footing is a) flexible, b) rigid.	choice Q-10		10Marks	CO3	4	3
10.	A circular well of 6 m external diameter and 0.75 m steining thickness is embedded up to a depth of 13 m in a uniform sand deposit. The angle of shearing resistance of sand and the submerged unit weight are 23 degrees and 1.0 t/m ³ , respectively. The well is subjected to a resultant horizontal force of 40 t and a total moment of 500 t-m at the scour level. Assuming the well to be a light well, compute the allowable total equivalent resisting force due to earth pressure. A factor of safety of 1.5 may be adopted for soil resistance . What will be the change in computed values for a heavy well when the well is assumed to be rotate about the base?			10Marks	CO3	4	4
11.	ANSWER ALL QUESTIONS	choice Q-12		15Marks	CO3	4	4
11.A.	Explain in detail about Minimum depth of well foundation.			5Marks	CO3	4	2
11.B.	Write down the design procedure for lateral stability analysis of well foundation by Terzaghi's Analysis.			10Marks	CO3	4	3
12.	ANSWER ALL QUESTIONS			15Marks	CO3	4	4
12.A.	Note down the components of settlement in soils			5Marks	CO4	4	2
12.B.	b. Find the settlement due to consolidation of a 3 m x 3 m column foundation with a load of 200 kN. The foundation is placed 1 m below the top surface and the clay layer is 9 m thick. There is a sand layer underneath the clay layer. The density of the clay layer is 18 kN/m ³ , the compression index (C_c) of the clay layer is 0.32, and initial void ratio (e_0) of clay is 0.80. Assume that the pressure is distributed at 2:1 ratio and the clay is normally consolidated.			10Marks	CO3	4	4
13.	A canal is to be excavated through a soil with $c = 15 \text{ kN/m}^2$, angle of internal friction = 20 degrees, $e = 0.9$ 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. Take $S_n = 0.06$	choice Q-14		10Marks	CO4	4	3
14.	A retaining wall with soft saturated clay back fill is 7 m high .The unit weight given as 16 kN/m ³ and cohesion is 17 kN/m ² . For the undrained condition of the backfill, determine i. The maximum depth of tensile crack ii. The active force before the tensile crack occurs and iii. The active force after the tensile crack occurrence of the tensile crack.			10Marks	CO4	4	4
15.	ANSWER ALL QUESTIONS	choice		15Marks	CO4	4	4

		Q-16				
15.A.	What are the classic theories considered for earth pressure analysis ?			5Marks	CO4	4 2
15.B.	Derive the equation for FS of infinite slope in a purely cohesive soil.			10Marks	CO4	4 4
16.	ANSWER ALL QUESTIONS			15Marks	CO4	4 4
16.A.	What are the design criteria to be satisfied for the stability of a gravity retaining wall?			5Marks	CO4	4 2
16.B.	Calculate the ratio of the coefficient of passive and active earth pressures of the backfill , when a movement of wall under the earth pressures from the backfill was prevented the coefficient of earth pressure was recorded as 0.5.			10Marks	CO4	4 4

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