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Question Paper Code: U5102

B.E./B.Tech. DEGREE EXAMINATION, NOV 2023

Fifth Semester

Civil Engineering

21UCE502 – FOUNDATION ENGINEERING

(Regulation 2021)

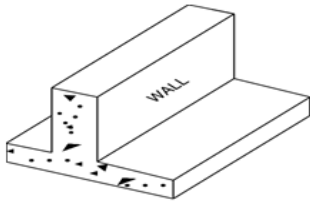
Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (5 x 1 = 5Marks)

1. In site exploration, the depth up to which the increase in pressure likely to cause shear failure CO1- U
(a) Failure depth (b) Pressure depth (c) Significant depth (d) Depth of exploration
2. Identify the footing shown in figure CO1- U



- (a) Isolated footing (b) Strip footing (c) Strap footing (d) None
3. The settlement of a group of friction piles can be computed on the assumption that CO1- U
(a) Clay is incompressible (b) Pile below the lower level is ignored
(c) Bearing resistance is zero (d) None of the mentioned
4. The expression for K_0 as given by Jacky is CO1- U
(a) $K_0 = 1 - \sin \phi$ (b) $K_0 = \sin \phi$ (c) $K_0 = 1 - \cos \phi$ (d) $K_0 = 1 + \sin \phi$
5. The allowable pressure, that should be selected for a maximum settlement is CO1- U
(a) 40 mm (b) 25 mm (c) 30 mm (d) 10 mm

PART – B (5 x 3= 15Marks)

6. The internal diameter of a sampler is 40mm and the external diameter is 42mm. How did you consider the sample obtained from the sampler as disturbed or undisturbed? CO2- App
7. If a circular footing of diameter 1.5 m resting on surface of saturated clay of unconfined compressive strength of 100 kN/ m². Take $N_c = 5.7$, $N_q = 1$ and $N_\gamma = 0$ The ultimate bearing capacity of the footing is? CO2- App
8. A timber pile was driven by a drop hammer weighing 30 kN with a free fall of 1.2 m. The average penetration of the last few blows was 5 mm. Examine the capacity of the pile according to Engineering News Formula. CO2- App
9. A rigid retaining wall 5 m high supports a backfill of cohesion less soil with $\phi = 30^\circ$. The water table is below the base of the wall. The backfill is dry and has a unit weight of 18 kN/m³. Determine Rankine's passive earth pressure per meter length of the wall CO2- App
10. List the different types of raft foundation. Under what circumstances, a raft footing is adopted? CO1-U

PART – C (5 x 16= 80Marks)

11. (a) Describe various methods of boring for sub surface investigations with neat sketch? CO1-U (16)
Or
(b) Describe the principle and procedure of conducting sub soil exploration study using Electrical resistivity method. CO1-U (16)
12. (a) A circular footing of 3m diameter found to provide a F.o.s of 3.1 if it has to carry a safe load of 1600kN. $C = 10$ kN/m², $\gamma = 18$ kN/m³. Analyze the depth at which a footing can carry a safe load Use Terzaghi Analysis. CO3-Ana (16)
Or
(b) A strip footing, 1 m wide at its base located at a depth of 0.6 m below the ground surface. The properties of the foundation soil are : $\gamma = 19$ kN / m³, $C' = 35$ kN/ m², $\phi = 20^\circ$, $N_c = 11.8$, $N_q = 3.9$, $N_\gamma = 1.7$, Analyze the safe bearing capacity, using a factor of safety of 3. Use Terzaghi's analysis. Assume that the soil fails by local shear. CO3- Ana (16)
If the water table is located at the base of the footing, determine the bearing capacity of soil, Assume unit weight of soil as equal to 20.5 kN / m³, Compare both the results.

13. (a) Determine the length required to be penetrated by the pile to support a safe working load of 350 kN. A concrete pile of diameter 40cm is to be driven in a stiff clay .Unconfined compressive strength of clay is 180 kN/m^2 .Take adhesion factor as 0.7. CO3- Ana (16)

Or

- (b) Determine the load capacity of the group consists of 9 piles arranged in a square pattern with diameter and length of each pile as 30cm & 12m respectively, is used as a foundation in soft clay deposit. Cohesion 60 kN/m^2 & the pile spacing as 100cm center to center,. Assume the bearing capacity factor $N_c=9$ and adhesion factor=0.60. A factor safety of 2.5 may be taken. CO3- Ana (16)

14. (a) Evaluate the stability of a cantilever retaining wall of smooth vertical back of 6m height 0.2m thick at top & 0.3 m at bottom foundation base of retaining wall of depth 0.6 m projected on left side as 0.5m and 2m on right side .It supports a sandy backfill with unit weight 18 kN/m^3 . Leveled to the top of wall .the angle of internal friction of soil is 34° . Use Rankine's Theory. CO5-Eva (16)

Or

- (b) A retaining wall 9 m high retains cohesion less soil, with an angle of internal friction 33° . The surface is level with the top of the wall. The unit weight of the top 3 m of the fill is 21 kN/m^3 and that of the rest is 27 kN/m^3 . Evaluate the magnitude and point of application of the resultant active thrust CO5-Eva (16)

15. (a) Consider you are a geotechnical engineer on construction of well foundation ,if your site undergoing sinking operation, Discuss what economical method do you choose for counteract the tilts in the well CO2- App (16)

Or

- (b) Prepare the remedial measures for tilt and shift in well foundation CO2- App (16)

