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**Question Paper Code: 95102**

B.E./B.Tech. DEGREE EXAMINATION, NOV 2024

Fifth Semester

Civil Engineering

19UCE502 – FOUNDATION ENGINEERING

(Regulation 2019)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (5 x 1 = 5 Marks)

- For Sampling Saturated sands and other soft and wet soils satisfactorily, the most suitable soil sampler is CO1- U  
(a) Open drive sampler (b) Rotary sampler  
(c) Piston Sampler (d) Split Spoon sampler
- The ultimate bearing capacity of a soil, is \_\_\_\_\_ CO2- U  
(a) total load on bearing area (b) safe load on the bearing area  
(c) load at which soil fails (d) load at which soil consolidates
- Based on the function, piles can be classified into \_\_\_\_\_ types. CO1- U  
(a) 4 (b) 6 (c) 8 (d) 3
- Gravity type retaining wall type is suitable for retaining backfill up to CO4- U  
(a) 3-5 m (b) 3-5 m (c) 4 - 7 m (d) 5-8 m
- For most soils, the limiting amplitude for low speed machines is usually CO5- U  
(a) 0.1 mm (b) 0.2 mm (c) 0.5 mm (d) 1.0 mm

PART – B (5 x 3= 15Marks)

- Express the Objectives Of Site Exploration. CO1- U
- What are the types of shallow foundation with diagram? CO2- U
- 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. If a retaining wall of 5 m high is restrained from yielding, what will be the total earth pressure at rest per meter length of wall? Given: the back fill is cohesion less soil having  $\phi = 30^\circ$  and  $\gamma = 18 \text{ kN/m}^3$ . CO2- App
10. On construction of well foundation what are all the safety measures ,precaution considered to prevent shifting and tilting CO3- App

PART – C (5 x 16= 80 Marks)

11. (a) Execute the Foundation Engineering knowledge to choose the foundation based on exploration? CO2-App (16)
- Or
- (b) Explain in detail about Electrical resistivity method of exploration in soil CO1-U (16)
12. (a) Define shallow foundation. Explain its types with neat sketch. CO2-U (16)
- Or
- (b) A strip footing 1.5m wide carries a load intensity of  $500 \text{ kN/m}^2$  at a depth of 1.5 m in sand. The saturated unit weight of sand is  $18 \text{ KN/m}^3$  and unit weight above water table is  $16.8 \text{ KN/m}^3$ . The shear strength parameters  $C=30$  and angle of shearing resistance  $\phi = 35^\circ$ .  $N_c = 57.8, N_q = 41.4$  and  $N_\gamma = 42.4$ . Analyse the factor of safety with respect to shear failure for the following
1. water table is 3 m below ground level
  2. water table is at ground level
  3. water table is 2.5 m below ground level
- water table is 1 m below ground level
13. (a) Explain in detail about various types of pile foundation with neat sketches CO1-U (16)
- Or
- (b) A group of 9 piles arranged in a square pattern with dia and length of each pile as 30cm & 12m respectively, is used as a foundation in soft clay deposit. Cohesion  $60 \text{ kN/m}^2$  & the pile spacing as 100cm centre to centre, find the load capacity of the group. Assume the bearing capacity factor  $N_c=9$  and adhesion factor=0.60. A factor safety of 2.5 may be taken. CO2-App (16)
14. (a) Derive Rankine's Active Earth Pressure Theory for passive earth pressure CO1- U (16)

Or

- (b) A smooth backed vertical wall is 6.3 m high and retains a soil with a bulk unit weight of  $18 \text{ kN/m}^3$  and  $\phi = 18^\circ$ . The top of the soil is level with the top of the wall and is horizontal. If the soil surface carries a uniformly distributed load of  $45 \text{ kN/m}^2$ , determine the total active thrust on the wall per metre of the wall and its point of application. CO3- Ana (16)
15. (a) Explain about the Principles of Machine Foundation. CO1- U (16)
- Or
- (b) On the construction of Brooklyn bridge in 1870 at New York's East river a unique and labor intensive method of construction is adopted but many lives were lost before the caisson foundation was excavated down to the bedrock layer due to compression sickness. What are your alternate method of construction of caisson that can be implemented under such situation. Justify your answer. CO3- Ana (16)

