C   Reg. No. : [ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ][ ]

Question Paper Code: U5102

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

Fifth Semester

Civil Engineering

21UCE502 – FOUNDATION ENGINEERING

(Regulation 2021)

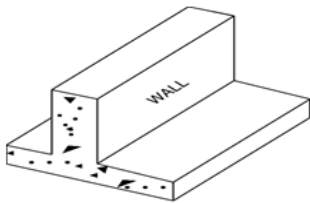Duration: Three hours   Maximum: 100 Marks

Answer ALL Questions

PART A - (5 x 1 = 5Marks)

1. For the construction of bus stand in your city, as a civil engineer method   CO1- U
   adopted for soil Exploration is

   (a) Seismic Refraction   (b) Excavation   (c) SPT Test   (d) Resistivity method

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   CO1- U
   assumption that

   (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 K0 as given by Jacky is   CO1- U

   (a) $K_0 = 1 - \sin \varphi$ (b) $K_0 = \sin \varphi$ (c) $K_0 = 1 - \cos \varphi$ (d) $K_0 = 1 + \sin \varphi$

5. Magnification factor (M) is very high if the value of frequency ratio (r) is   CO1- U

   (a) less than 0.4   (b) 0.4 to 1.50   (c) greater than 1.50   (d) unity

6. Differentiate disturbed and undisturbed sample.   CO1-U

7. Describe the limitations of Terzaghi's Analysis   CO1-U

8. Interpret the group efficiency of pile with its advantages.   CO1-U

9. Enumerate the assumptions made in Rankine's theory.   CO1-U

10. Differentiate box caisson and pneumatic caisson.   CO1-U

PART – C (5 x 16= 80 Marks)

11. (a) Describe various methods of boring for sub surface investigations CO1-U   (16)
        with neat sketch?

                                        Or

    (b) Explain in detail about direct and indirect methods of exploration in CO1-U   (16)
        soil.

12. (a) A square footing 3 m by 3 m is built in a homogeneous bed of sand CO3-Ana   (16)
        of unit weight 20 kN / m^3 and having an angle of shearing resistance
        of 36 ^{0}. The depth of base of footing is 1.5 m below the ground
        surface. Analyze the safe load that can be carried by footing with a
        factor of safety of 3 against complete shear failure use Terzaghi's
        analysis.

                                        Or

    (b) A strip footing, 1 m wide at its base located at a depth of 0.6 m CO3- Ana   (16)
        below the ground surface. The properties of the foundation soil are :
        γ = 19 kN / m^3 , C' = 35 kN/ m^2 , φ = 20 ^{0}, Nc = 11.8, Nq = 3.9,
        Nγ = 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.
         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 / m^3, Compare both the results.

13. (a) Determine the group efficiency of a pile group consists of 16 piles CO3- Ana   (16)
        of each 20m long and 1m diameter with center to center distance on
        both directions equal to 1.0m which are embedded on a clay deposit
        having cohesive strength of 35 kN/m^2 by static method , feld's rule
        and converse Labarre formula , Take adhesion factor as 0.6

                                        Or

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(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 60kN/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) Explain Rankine' s theory for the cases of cohesion less backfill.   CO1-U   (16)

Or

(b) Explain with neat sketch the culmann's method of calculating active earth pressure.   CO1-U   (16)

15. (a) Define mat foundation. What are the various types of raft foundations?   CO1-U   (16)

Or

(b) State the design requirement of a foundation? Explain the conventional method of design of raft foundation.   CO1-U   (16)

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