A   Reg. No. : [ ][ ][ ][ ][ ][ ][ ][ ][ ][ ]

Question Paper Code: 55102

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

Fifth Semester

Civil Engineering

15UCE502 - FOUNDATION ENGINEERING

(Regulation 2015)

(IS 6403-1981 is permitted)

Duration: Three hours   Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. For an undisturbed sample the area ratio of the sample should be   CO1- R

    (a) 0   (b)10% or less   (c)10% to 20%   (d) More than 20%

2. The Standard penetration test is useful to measure   CO1- R

    (a) Shear strength of clay   (b) Shear strength of sand

    (c) Consistency   (d) None of the above

3. A Shallow foundation is usually defined as a foundation which has   CO2- R

    (a) Depth less than 0.6m   (b) Depth less than its width

    (c) Depth less than 1m   (d) None of the above

4. The permissible settlement is the maximum in the case of   CO2- R

    (a) Isolated footing on clay   (b) Raft on clay

    (c) Isolated footing on sand   (d) Raft on sand

5. The load carrying capacity of the pile depends on   CO3- R

    (a) Skin friction   (b) Point resistance   (c) Both a and b   (d) Neither a or b

6. The group efficiency of driven piles in sand at a close spacing may be   CO3- R

    (a) Equal to 100%   (b) Greater than100%

    (c) Well below 100%   (d) None of the above

7. The active earth pressure coefficient (Ka) generally refers to   CO4- R

   (a) Effective stress   (b) Total stress   (c) Neutral stress   (d) All of the above

8. The minimum allowable factor of safety against sliding in case of   CO4- R
   cantilever retaining wall is

   (a) 2.0   (b) 3.0   (c)1.5   (d) 2.5

9. A Well foundation is a type of   CO5- R

   (a) Open caisson   (b) Pier   (c) Floating caisson   (d) Drilled pier

10. The most commonly used Well foundation   CO5- R

   (a) Double-D   (b) Circular   (c) Double octagonal   (d) Rectangular

PART – B (5 x 2= 10 Marks)

11. Differentiate between Disturbed and Undisturbed.   CO1- R

12. Compare General shear failure and Local shear failure.   CO2- R

13. Define Negative skin friction.   CO3- R

14. List any two assumptions made in Coloumb's earth pressure theory   CO4- R

15. Define Damping.   CO5- R

PART – C (5 x 16= 80Marks)

16. (a) Explain Standard Penetration Test with corrections.   CO1 U   (16)

                              Or

    (b) Explain any two Geophysical methods of soil explorations.   CO1 U   (16)

17. (a) A Circular footing is resting on a stiff saturated clay with   CO2 App   (16)
         qu = 250 kN/m^2. The depth of foundation is 2 m. Determine the
         diameter of the footing if the column load is 600 kN. Assume a
         factor of safety of 2.5. The bulk unit weight of soil is 20 kN/m^3.

                              Or

    (b) (i) A reinforced concrete foundation, of dimensions 18 m × 36 m,   CO2 Ana   (8)
         exerts a uniform pressure of 180 kN/m^2 on a soil mass, with
         E - value 45 MN/m^2. Determine the value of immediate
         settlement under the foundation.

         (ii) Discuss the methods of minimizing settlement and differential   CO2 U   (8)
         settlement in cohesive soils.

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18. (a) Explain the various classification of Pile Foundations.   CO3 U   (16)

Or

(b) A 16-pile group has to be arranged in the form of a square in soft   CO3 Ana   (16) clay with uniform spacing. Neglecting end-bearing, determine the optimum value of the spacing of the piles in terms of the pile diameter, assuming a shear mobilisation factor of 0.6.

19. (a) A gravity retaining wall retains 12 m of a backfill, $\gamma = 17.7 \text{ kN/m}^3$ CO4- Ana   (16) $\varphi = 25°$ with a uniform horizontal surface. Assume the wall interface to be vertical, determine the magnitude and point of application of the total active pressure. If the water table is a height of 6 m, how far do the magnitude and the point of application of active pressure changed?

Or

(b) Explain Culmann's method of earth pressure theory.   CO4- Ana   (16)

20. (a) List out the different types of machine foundations and describe   CO5- U   (16) the factors considered for design of Tower foundation.

Or

(b) Describe the various components of a well foundation, indicating   CO5- U   (16) their function.

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