C   **Reg. No. :**

Question Paper Code: R5102

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2025

Fifth Semester

Civil Engineering

R21UCE502 FOUNDATION ENGINEERING

(Regulations R2021)

Duration: Three hours   Maximum: 100 Marks

Answer ALL Questions

PART A - (5 x 1 = 5Marks)

1. The cone test is very useful in   CO1- U

   (a) Cohesion-Less Soils   (b) Cohesive Soils   (c) Clays   (d) Silty Clay

2. When a footing fails due to insufficient bearing capacity, distinct failure patterns   CO1- U
    are developed depending upon

   (a) Failure mechanism   (b) Plastic equilibrium

   (c) Shear strength   (d) All of the mentioned

3. The allowable load for the pile is given by _____ equation   CO1- U

   (a) Qa = Qup/ F   (b) Qa = Qup× F

   (c) Qa = WH /F(S+C)   (d) Qa = WH /6(S+2.5)

4. The flow value is given by   CO1 U

   (a)Nφ=cot2(45°+φ2)   (b) Nφ=cos2(45°+φ2)

   (c) Nφ=tan2(45°+φ2)   (d) Nφ=sin2(45°+φ2)

5. . _____ forms the most common type of deep foundation for bridges   CO1 U

   (a) Pile foundation   (b)Well foundation   (c)Shallow foundation   (d) Pier foundation

PART – B (5 x 3= 15 Marks)

6. Interpret limitations of static Cone penetration test   CO1 U

7. Differentiate ultimate bearing capacity and allowable bearing capacity.   CO1 U

8. Define negative skin friction.   CO1 U

9. write any two assumptions in coulomb's wedge theory CO1 U

10. List the conditions of providing foundation for transmission tower. CO1- U

PART – C (5 x 16= 80 Marks)

11. (a) How does a bore log help in determining the suitability of soil for foundation design? CO1- U (16)

OR

(b) Describe the salient features of a good sub-soil investigation report? CO1- U (16)

12. (a) A strip footing, 2.5 m wide at its base located at a depth of 0.6 m 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, CO2- App (16)

   i) Determine the Safe bearing capacity, using a factor of safety of 3. Use Terzaghi's analysis. Assume that the soil fails by local shear.

   ii) 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

OR

(b) A rectangular footing has a size of 1.8mX3m has to transmit the load of a column at a depth of 1.5m.Calculate the safe load which the footing can carry at a factor of safety of 3 against shear failure. Use IS code Method. The soil has following Properties n=40%,G=2.67,w=15%,C=8 KN/m^2, φ = 32.5^o CO2- App (16)

13. (a) What is meant by piles foundation? Explain the various types of pile foundation in detail CO1- U (16)

OR

(b) Explain in detail the procedure for pile load test to determine the load carrying capacity of pile. CO1- U (16)

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

OR

(b) Explain in detail about active earth pressure of cohesive soil by Rankine's theory CO1- U (16)

R5102

15. (a) Explain about the Principles of Machine Foundation. CO1- U (16)

OR

(b) How are tilt and shift of well foundations prevented and minimized? CO1- U (16)

R5102