

Reg. No. :

--	--	--	--	--	--	--	--	--	--

**Question Paper Code: 35102**

B.E. / B.Tech. DEGREE EXAMINATION, DEC 2021

Fifth Semester

Civil Engineering

01UCE502 – FOUNDATION ENGINEERING

(Regulation 2013)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 2 = 20 Marks)

1. What is significant depth of exploration?
2. What is a representative sample?
3. What are the disadvantages of plate load test?
4. What is tolerable settlement?
5. State the situations under which the raft foundation is adopted.
6. Define spread footing.
7. Explain negative skin friction.
8. What is under reamed piles and under which circumstance you will suggest under reamed piles?
9. Differentiate between active earth pressure and passive earth pressure.
10. Illustrate the assumptions made by coulomb in development of the coulomb's wedge theory?

PART - B (5 x 16 = 80 Marks)

11. (a) Explain wash boring method with neat sketch. Also explain how depth of boring and spacing of borehole is decided. (16)

Or

- (b) Explain with sketch how standard penetration test is conducted. Also explain the corrections to be carried out to the observed  $N$  value. (16)
12. (a) A square footing  $1.2 \times 1.2 \text{ m}$  rests at a depth of  $1 \text{ m}$  in a saturated clay layer  $4 \text{ m}$  deep. The clay is normally consolidated, having an unconfined compressive strength of  $40 \text{ kN/m}^2$ . The soil has a liquid limit of  $30\%$ ,  $r_{sat} = 17.8 \text{ kN/m}^2$ ,  $w = 28\%$  and  $G = 2.68$ . Determine the load which the footing can carry safely with a factor of safety of 3 against shear. Also, determine the settlement if the footing is loaded with this safe load. Use terzaghi's analysis for bearing capacity if the values of  $N_c = 5.7, N_q = 1, N\gamma = 0$ . (16)

Or

- (b) (i) A footing  $3 \times 1.5 \text{ m}$  in plan transmits a pressure of  $160 \text{ kN/m}^2$  on a cohesive soil having  $E = 8 \times 10^4 \text{ kN/m}^2$  and  $\mu = 0.48$ . Determine the immediate settlement at the centre, assuming the footing is (1) Flexible (2) Rigid (8)
- (ii) Explain in detail about the factors affecting bearing capacity. (8)
13. (a) Explain the different types of mat foundation with neat sketches. (16)

Or

- (b) A raft foundation  $10 \text{ m}$  wide and  $12 \text{ m}$  long is to be constructed in a clayey soil having shear strength of  $12 \text{ kN/m}^2$ . Unit weight of soil is  $16 \text{ kN/m}^3$ . If the ground surface carries a surcharge of  $20 \text{ kN/m}^2$  calculate the max depth of foundation to ensure a factor of safety of 1.2 against base failure,  $N_c = 5.7$ . (16)
14. (a) A  $200 \text{ mm}$  diameter,  $8 \text{ m}$  long piles are used as foundation for column in a uniform deposit of medium clay ( $q_u = 100 \text{ kN/m}^2$ ). The spacing between the piles is  $500 \text{ mm}$ . There are 9 piles in the ground arranged in a square pattern. Calculate the ultimate pile load capacity of the group. Assume adhesion factor = 0.9. (16)

Or

- (b) (i) Describe in detail about the pile load tests with neat sketch, also discuss about cyclic load test and draw load penetration curve. (10)
- (ii) Briefly explain about negative skin friction. (6)

15. (a) Derive the expression for active earth pressure for cohesive backfill. Also draw the pressure distribution diagram and explain the salient features. (16)

Or

- (b) A retaining wall with soft saturated clay backfill is 7 m high. For the undrained condition ( $\phi = 0$ ) of the backfill, determine:
- (i) The maximum depth of the tensile crack
  - (ii) The active force before the tensile crack occurs. (16)

