**Reg. No. :** 

## Question Paper Code: U5102

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

Fifth Semester

Civil Engineering

21UCE502-FOUNDATION ENGINEERING

(Regulations 2021)

Duration: Three hours                                              Maximum: 100 Marks

PART A - (5 x 1 = 5Marks)

1.  The Area Ratio for collecting Undisturbed sample should be            CO1-U

    (a) >20             (b) >10             (c) <10             (d) <20

2.  In shallow foundation if Rw = 1 & Rw' = 0.5 than where the water            CO2-App
    table lies

    (a) At base of footing               (b) Below the footing

    (c) At the ground level              (d) Anywhere at the mid

3.  The group efficiency of the driven piles in sand at a closed spacing            CO1-U
    may be

    (a) equal to 100%      (b) > 100%            (c) <100%            (d) none of these

4.  A hash function guarantees integrity of a message. It guarantees that            CO1-U
    message has not been

    (a) 1/3             (b) 3             (c) 1             (d) 1/2

5.  The allowable pressure, that should be selected for a maximum            CO1-U
    settlement is
    (a) 40 mm            (b) 25 mm            (c) 30 mm            (d) 10 mm

PART – B (5 x 3= 15Marks)

6.  The internal diameter of a sampler is 40 mm and the external diameter is   CO2-App
    42mm. How did you consider the sample obtained from the sampler as
    disturbed or undisturbed?.

7.  If a circular footing of diameter 1.5 m resting on surface of saturated clay of   CO2-App
    unconfined compressive strength of 100 kN/m$^2$ . Take Nc = 5.7, Nq = 1 and
    Nγ = 0 The ultimate bearing capacity of the footing is?

8. What is under reamed pile? When is it preferred? CO1-U

9. Draw the force polygon for lateral active earth pressure on wall retaining CO2-App cohesion less soil according to Terzaghi Analysis

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

## PART – C (5 x 16= 80Marks)

11. (a) Explain in detail the geophysical methods of soil explorations with neat sketch CO1-U (16)

Or

(b) Describe the principle and procedure of conducting sub soil exploration study using Electrical resistivity method. CO1-U (16)

12. (a) A strip footing 1.5m wide carries a load intensity of $500kN/m^2$ at a depth of 1.5 m in sand. The saturated unit weight of sand is 18 $KN/m^3$ and unit weight above water table is 16.8 $KN/m^3$. The shear strength parameters C=30 and angle of shearing resistance $\phi$ = 35°. Nc = 57.8,Nq = 41.4 and N $\gamma$ = 42.4. Analyse the factor of safety with respect to shear failure for the following CO3-Ana (16)

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

Or

(b) A square footing 2.5 m by 2.5 m is built in a homogeneous bed of sand 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. CO3-Ana (16)

13. (a) A group of 9 piles with 3 piles in a row was driven into soft clay extending from ground level to a great depth. The diameter and length of piles were 0.3 m and 10 m respectively. The unconfined compressive strength of clay is 70 $KN/m^2$.If the piles were spaced at 90 cm centre to centre, compute the allowable load on the pile group on the basis of shear failure criteria for a F.O.S 2.5. Neglect bearing at the tip of piles. Take m=0.6 for shear mobilization around. CO2-App (16)

Or

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(b) A group of 16 piles of 600 mm diameter is arranged in a square    CO2-App    (16)
pattern with centre to centre spacing of 1.2 m.The piles are 10m
long and are embedded in soft clay with cohesion of 30
$KN/m^2$,bearing resistance may be neglected for the piles.
Adhesion factor is 0.6.Determine the ultimate load capacity of the
pile group.

14. (a) A retaining wall 12 m high has a smooth vertical back. The    CO3-Ana    (16)
backfill has a horizontal surface in level with the top of the wall.
There is uniformly distributed surcharge load of 36 $kN/m^2$
intensity over the backfill. The unit weight of the backfill is 18
$kN/m^3$ its angle of shearing resistance is $30^o$ and cohesion is zero.
Determine the magnitude and point of application of active
pressure per metre length of the wall.

Or

(b) A Vertical excavation was made in a clay deposit having weight    CO3-Ana    (16)
of 20 $kN/m^3$. It caved in after the depth of digging reached 4
meters. Taking the angle of internal friction to be zero, calculate
the value of cohesion. If the same clay is used as a backfill
against a retaining wall, upto a height of 8 metres, calculate i)
Total active earth pressure ,ii) Total Passive earth Pressure.
Assume that the wall yields for enough to allow Rankine
deformation conditions to establish.

15. (a) Explain in detail about the different methods for construction of    CO1-U    (16)
well foundation.

Or

(b) How the prevention and minimization of tilt and shift of well    CO1-U    (16)
foundation is done?

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