Seat
No.

T.E. (Civil) (Part-II) (Semester-VI) (Revised) (New)
Examination, April - 2016
GEOTECHNICAL ENGINEERING-II
Sub. Code: 66874

Day and Date : Monday, 18- 04 - 2016   **Total Marks : 100**

Time : 3.00 p.m. to 6.00 p.m.

Instructions :   1)   **All questions are compulsory.**

2)   **Figures to the right indicate full marks.**

3)   **Make assumptions wherever necessary.**

4)   **Use of non-programmable calculator is allowed.**

SECTION-I

Q1) Solve Any Two from following: [16]

a)   List and explain various types of boring methods used to collect soil or rock sample.

b)   List and explain various strength properties of rock.

c)   List and explain index properties of rock.

Q2) Solve Any Two from following: [18]

a)   Explain Menard pressure meter test for determination of bearing capacity of soil.

b)   A rectangular foundation 2 m × 3 m rests on c – φ soil, with its base at 1.5m below the ground surface. Calculate the safe bearing capacity using a factor of safety by considering.

P.T.O.

    i)   Net ultimate bearing capacity.

    ii)   Ultimate bearing capacity.

The soil has properties as unit weight -18 kN/m^3, cohesion -10 kN/m^2, $\varphi = 30°$, for $30°$, Nc = 37.2, Nq = 22.5, Nr = 19.7. Use Terzaghi's analysis.

c)   A strip foundation 1.2 m wide is located at a depth of 2m in non cohesive soil deposit for which the corrected N value of Standard Penetration Test is 22. Water table is located at a depth of 2.8m below the ground level. Find the allowable gross safe pressure for the soil, if unit weight of soil solid is 19 kN/m^3.

Q3) Solve Any Two from following: [16]

a)   Explain IS code (conventional method) for design of raft foundation.

b)   In a normally consolidated clay of liquid limit -65.5%, saturated water content -45%, Sp. Gravity = 2.7 and 5m thickness, the overburden pressure is increased from 250 kN/m^2 by 120 kN/m^2. Estimate the settlement that can take place.

c)   Design a combined foundation in a soil of bearing capacity 150 kN/m^2. The two column loads of 1100 kN and 750 kN at distance of 5.4m. Both the column sizes are 0.5m × 0.5m at distance of 5.4m. The column with heavier load is on the boundary of the plot with restriction to length of the foundation from inner side also.

<div align="center"><u>**SECTION-II**</u></div>

Q4) Solve Any Three from following: [18]

a)   What is group efficiency of pile group? Explain Converse-Labarre method of evaluating it.

b) Write a note on under reamed pile.

c) A concrete pile 45 cm in diameter and 15m long is driven into a homogeneous mass of clay soil of medium consistency. The water table is at the ground surface. The unit cohesion of the soil under undrained condition is 50 kN/m^2 and the adhesion factor $\alpha = 0.75$. Compute ultimate load carrying capacity and safe load carrying capacity of pile with F.S. = 2.5.

d) A n-pile group has to be proportioned in a uniform pattern in soft clay with equal spacing in all directions. Assuming any value of cohesion, determine the optimum value of spacing of pile in the group. Take n = 25 and m = 0.7 for shear mobilization around each pile. Neglect the end bearing effect and assume that each pile is circular in section.

Q5) Solve Any Two from following: [16]

a) Draw the cross section of well foundation and name & explain the different parts.

b) What are the advantages and disadvantages of caisson foundation over piles?

c) What is cofferdam? What are the advantages of cellular cofferdam?

Q6) Solve Any Two from following: [16]

a) Name the techniques used in ground improvement and explain any one in short.

b) Explain friction circle method of slope stability analysis.

c) Stability analysis by Swedish method of slices gave the following values per running meter for a 10m high embankment.

    i)   Total shearing force = 480 kN

    ii)   Total normal force = 1950 kN

    iii)   Total neutral force = 250 kN

    iv)   Length of arc = 22m

If the properties of soil are c = 24 kN/m^2 and φ = 6°, calculate the factor of safety w.r.t. shear strength.

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