Day : Wednesday   Time : 02:30 PM-05:30 PM
Date : 01-06-2022   **S-13622-2022**   Max. Marks : 60

N.B.:
  1) All questions are **COMPULSORY**.
  2) Figures to the right indicate **FULL** marks.
  3) Use of non-programmable **CALCULATOR** is allowed.
  4) Draw neat and labeled diagram **WHEREVER** necessary.
  5) Assume suitable data if necessary.

Q.1 **a)** Explain in brief various types of samples used for collecting soil samples   **[05]**

    b) Explain the seismic refraction method of soil exploration. State its limitations.   **[05]**

OR

Q.1 **a)** Explain with neat sketch pressure meter test of soil exploration.   **[05]**

    b) Explain cone penetration test of soil exploration.   **[05]**

Q.2 **a)** Explain the Skemptons method of estimation of bearing capacity for strip footing.   **[05]**

    b) A circular footing of 2.5 m diameter has to carry a gross load of 4000 kN. The foundation soil is Clayey and having C = 5.4 kN/m^2, ϕ = 28°, γ = 19.8 kN/m^3. Find the depth at which footing should be placed for a factor of safety of 3.0. Assume N_c = 29.5, N_q = 18.6, N_γ = 22.5.   **[05]**

OR

Q.2 **a)** What is the effect of water table on bearing capacity of soil? Explain.   **[05]**

    b) A strip footing of 1.5 m width is founded at a depth of 2 m below G.L.in a (C – ϕ) soil having cohesion C = 30 kN/m^2 and ϕ = 35°. The water table is at a depth of 8 m below G.L. The moist weight of soil above water table is 17.0 kN/m^3. Determine the ultimate bearing capacity of soil. Assume for ϕ = 35°, N_c = 57.8, N_q = 41.4, N_γ = 42.4.   **[05]**

Q.3 **a)** Explain the concept of spring analogy in consolidation with neat sketch.   **[05]**

    b) In a consolidation test, a specimen whose void ratio was 1.068 under effective pressure of 214 kN/m^2 changed to 0.994 when effective pressure was increased to 429 kN/m^2. Compute the coefficient of compressibility and compression index.   **[05]**

OR

Q.3 **a)** State the assumptions of the Terzaghi's theory of one dimensional consolidation.   **[05]**

    b) An undisturbed sample of clay stratum 4 m thick was tested in a Laboratory and average value of C_v was found to be 2×10^{-4} cm^2/s. If the structure is built on the same clay strata, how long will it take to attain half the ultimate settlement under the load of the structure? Assume double drainage.   **[05]**

P.T.O.

Q.4 a) Compare between cast in situ piles and driven piles.   [05]

b) Explain the principle of estimation of load carrying capacity of pile by dynamic [05] methods. Also state the ENR formula for estimation of load carrying capacity.

<p style="text-align:center">OR</p>

Q.4 a) What is meant by efficiency of a pile group? How do you estimate efficiency [05] of pile group in sand for end bearing and friction piles?

b) What are micropiles? Where they are used?   [05]

Q.5 a) Explain with sketches anchored sheet piles with free earth support and fixed [05] earth support.

b) State the characteristics of black cotton soils. Explain the term differential free [05] swell for black cotton soils.

<p style="text-align:center">OR</p>

Q.5 a) What are sheet piles? Explain with examples application of sheet piles.   [05]

b) Explain various preventive measure used for foundations an expansive soils.   [05]

Q.6 a) Explain characteristics and uses of following types of geosynthetics: [05]
  i) Geogrids
  ii) Geomembranes
  iii) Geocomposites

b) Explain the hydraulic functions of geotextiles.   [05]

<p style="text-align:center">OR</p>

Q.6 a) Explain the concept of reinforced earth. State the application of reinforced [05] earth.

b) Explain with sketches uses of geotextile for reinforcement.   [05]

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