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Total No. of Questions : 09] [Total No. of Pages : 02

Paper ID [CE412]

(Please fill this Paper ID in OMR Sheet)

B. Tech. (Sem. - 7th/8th)

FOUNDATION ENGINEERING (Paper - I) (CE - 412)

Time : 03 Hours **Maximum Marks : 60**

Instruction to Candidates:

1) Section - A is **Compulsory**.
2) Attempt any **Four** questions from Section - B.
3) Attempt any **Two** questions from Section - C.

Section - A

Q1) *(10 × 2 = 20)*

a) What do you mean by isobar and pressure bulb?

b) What are the major criteria to be satisfied in the design of a foundation?

c) Differentiate between ultimate bearing capacity, safe bearing capacity, safe bearing pressure and allowable bearing pressure.

d) What are the factors influencing the bearing capacity of a footing on cohesion less soil.

e) What is negative skin friction?

f) What are the limitations of the dynamic pile load formulas?

g) Explain the concept of critical depth as related to the determination of point bearing and skin friction resistance in a pile.

h) What are the four basic soil spring constants which are used in the analysis of foundations subjected to dynamic loads?

i) List the fields commonly used in subsurface investigation.

j) Differentiate between representative and non-representative sample.

Section - B

(4 × 5 = 20)

Q2) Write down the Terzahi's general equation for computing ultimate bearing capacity of soils below a footing, classifying the basis and assumptions made in its derivation.

Q3) How do you extrapolate the settlement data of a single pile to determine the probable settlement of a group of pile in sand?

Q4) A rectangular foundation 2m × 3m transmits a pressure of 360 kN/m^2 to the underlying soil. Determine the vertical stress at a point 1 meter vertically below a point lying outside the loaded area, 1 meter away from a short edge and 0.5 meter away from a long edge.

Q5) A cylindrical well of external diameter 6m and internal diameter 4m is sunk to a depth of 16m below the maximum scours level in sand deposits. The well is subjected to a horizontal force of 1000 kN acting at height of 8m above the scour level. Determine the lateral allowable equivalent resisting force due to earth pressure, assuming that the wall rotates about a point above the base. Assume = 10 kN/m^3, $\phi = 30°$, F.O.S. = 2. Use Terzahi's Approach.

Q6) Explain and discuss the various factors that help to decide the depth and number of bore holes required for subsoil exploration.

Section - C

(2 × 10 = 20)

Q7) List provisions of IS code for the design of foundations for reciprocating machines.

Q8) A footing 2m square, rests on a soft clay soil, with its base at a depth of 1.5m from ground surface. The clay stratum is 3.5m thick and is underlain by a firm sand stratum. The clay soil has liquid limit = 30%, G = 2.67, water content at saturation = 40%, cohesion = 0.5kN/m^2. It is known that the clay stratum is normally consolidated. Compute the settlement that would result if the load intensity equal to safe bearing capacity of soil were allowed to act on the footing. Natural water table is quite close to the ground surface. Take F.O.S. = 3. For a give conditions bearing capacity factor (N_c) is obtained as 6.9.

Q9) In a 16 pile group, the pile diameter is 0.4m and C/C spacing of piles in the square group is 1.5m. If C_u = 50 kN/m^2, determine whether the failure would occur as a block failure or when the piles act individually. Neglect bearing at the tip of the piles. All the piles are 12m long. Take α = 0.7 for shear mobilization around each pile Also determine the safe load on the group.