B.Tech. (Sem. - 7th/8th)
FOUNDATION ENGINEERING
SUBJECT CODE : CE - 412
Paper ID : [A0629]

[Note : Please fill subject code and paper ID on OMR]

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) Differentiate between safe bearing capacity and allowable bearing pressure.

b) A 30 cm square bearing plate settles by 1.5 cm in a plate load test on a cohesive soil when the intencity of loading is 2 kg/cm^2. Calculate the settlement of a prototype shallow footing 1 m square under the same intensity of loading.

c) Write down the corrections to be applied in observed 'N' values during SPT.

d) Give typical contact pressure diagrams under flexible footing for sandy soils and clays.

e) Enumerate the objectives of cyclic load test on piles.

f) Define 'floating foundation'.

g) For settlement evaluation of friction pile groups in clay, the load is assumed to be applied as a uniform load at a depth of about-------- the length of pile from top. Fill the gap in the sentence.

h) Define 'Area ratio' for a soil sampler.

i) Identify the incorrect statement.

   Undisturbed samples are obtained from

   (i) Thin-walled tube sampler   (ii) Piston sampler

   (iii) Split-spoon sampler   (iv) Hand-trimmed sampling.

j) Enumerate the different types of Machine Foundations.

Section - B

$(4 \times 5 = 20)$

Q2) What are the different type of settlements which are to be considered in the design of a shallow foundation? How do you calculate them?

Q3) A group of nine piles, 12 m long and 250 mm in diameter is to be arranged in a square form in a clay soil with an average UCS = 60 kN/m². Workout the c/c spacing of the piles for a group efficiency of 100%. Neglect bearing at the lip of pile.

Q4) Draw a neat sketch of typical well foundation lebelling its component parts with a brief description.

Q5) A mass of 5 kg is attached to the lower end of spring whose upper end is fixed. The natural period of this system is 0.40 second. Determine the natural period when a mass of 2.5 kg is attached to the midpoint of this spring with upper and lower ends fixed.

Q6) What are various methods of boring for soil exploration? Enumerate and describe.

Section - C

$(2 \times 10 = 20)$

Q7) Derive an expression for natural frequency of a block foundation under rocking vibrations.

Q8) A group of nine friction piles of 200 mm diameter spaced at 0.5 m transfer a load of 400 kN into a 10 m thick clay layer with sand below. It penetrates to a depth of 6 m in the caly layer. Estimate the probable settlement of the pile group assuming water table at ground level. Take water content = 39%, G = 2.7 and γ_{sat} = 20 kN/m³.

Q9) Derive an expression of vertical pressure of circularly loaded area at a depth z below its centre.

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