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15CV834

Eighth Semester B.E. Degree Examination, Aug./Sept.2020
Advanced Foundation Design

Time: 3 hrs. Max. Marks: 80

Note: i) For Regular Students: Answer any FIVE full questions irrespective of modules.
ii) For Arrear Students : Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Write about the assumptions and limitation in Terzaghi's analysis. **(08 Marks)**

b. Explain the different types of foundation settlements. **(08 Marks)**

2 a. Explain the differences between Terzaghi's and Meyerhoff's theories of bearing capacity. **(08 Marks)**

b. A strip footing 1 m wide at its base is located at a depth of 0.8 m below the ground surface. The properties of foundation soil are $\gamma = 18$ kN/m^3, $c = 0.03$ N/mm^2, $\phi = 20°$. Determine the SBC of soil using Terzaghi's analysis. Assume FOS = 3.

ϕ	N_c	N_q	N_γ
10	9.6	2.7	1.2
15	12.9	4.4	2.5
20	17.7	7.4	5.0

(08 Marks)

Module-2

3 a. Discuss the situations under which raft foundation becomes essential. **(06 Marks)**

b. Proportion a trapezoidal combined footing for two columns 300 mm × 300 mm carrying column loads of 800 kN and 1200 kN, if the spacing between the columns is 4.5 m. Take the allowable soil pressure as 250 kN/m^2 and the length of the footing as 5m. **(10 Marks)**

4 a. What is meant by modulus of sub-grade reaction? On what factor does it depend? **(08 Marks)**

b. A combined footing has to be proportioned for the two columns detailed below:

Column load	Column C_1	Column C_2
Dead load	550 kN	700 kN
Live load	400 kN	800 kN

The distance between the column is 5m, the footing should not be beyond 0.5 m from the centre of the column the soil pressure to be considered are :
For dead load + Reduced L.L = 160 kN/m^2
For dead load + L.L = 230 kN/m^2 **(08 Marks)**

Module-3

5 a. Classify the piles according to function with neat figure. **(10 Marks)**

b. Explain "Engineering News formula" for estimating capacity of a single pile with usual notations. **(06 Marks)**

6 a. What is negative skin friction? Explain with a neat sketch. **(08 Marks)**

b. A group of 9 piles with 3 piles in a row was driven into a soft clay extending from ground level to a greater depth. The diameter and length of the piles were 30 cm and 10 m respectively. The unconfined compressive strength of the clay is 70 kN/m^2. If the piles were placed 90 cm c/c. Compute allowable load on the pile group on the basis of shear failure with a factor of safety of 2.5. **(08 Marks)**

Module-4

7 a. List the types of Caisson's and explain the advantage and disadvantages of pneumatic Caisson's. **(08 Marks)**

b. A drilled pier as shown in Fig.Q7(b).

(i) Determine the ultimate point bearing resistance and skin resistance.

(ii) Assuming the compressive strength of concrete as 25000 kN/m^2, determine whether the assumed diameter of the shaft is adequate or not.

(iii) Calculate the factor of safety with respect to a working load of 3000 kN.

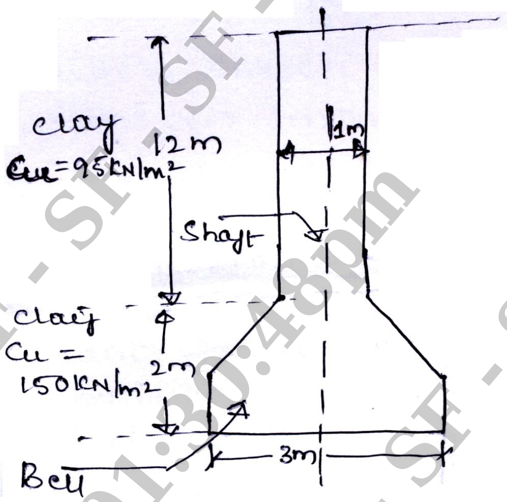

Fig.Q7(b) **(08 Marks)**

8 a. Explain in detail the sinking of well. **(10 Marks)**

b. List the forces acting on well foundation. **(06 Marks)**

Module-5

9 a. Define:

(i) Natural frequency

(ii) Single degree freedom

(iii) Viscous damping **(06 Marks)**

b. Derive an expression for vibration motion of a SDOF system under undamped free vibration. **(10 Marks)**

10 a. With a sketch explain the foundation for an impact machine. **(08 Marks)**

b. Determine the coefficient of elastic uniform compression if a vibration test on a concrete block of 1m cube gave a resonant frequency of 36 Hz in vertical vibration. The weight of the oscillator used was 500 N. Take the unit weight of concrete as 24.0 kN/m^3. **(08 Marks)**

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