**B.E Construction Engineering 3rd year 2nd semester examination 2022**

FOUNDATION ENGINEERING

**EX/CØN/PC/B/T322/2022**

Part – I

Full Marks-50 Time – 3 hours

Assume relevant data if required

Answer any two questions.

Q-1 (a) Determine allowable bearing capacity of a strip footing of width 1.A m, which rests a depth of 1.A meter below existing ground level in a subsoil as shown in Fig-1. Ground water table at proposed site was found lie at a depth of 2.5 m below ground level.

EGL----------

C= 1.8 t/m$^2$ , $\phi = 22^0$ , $\gamma = 1.87$ t /m$^3$ $M_v = 0.0036$ m$^2$ / t Grey Clayey silt

5.0 m ----------

C= 3.2 t/m$^2$ , $\phi = 0$ , $\gamma = 1.85$ t /m$^3$ $M_v = 0.0031$ m$^2$ / t Soft grey silty clay

**Fig-1.**

(b) If the foundation type is changed from strip to square with the same foundation width , then determine the percentage change in allowable bearing capacity (25)

Q-2. (a) If two columns are spaced at distance of 4.0 m c/c with a column load of 40t and 50 t in the subsoil as shown in Fig-1 , calculate the differential settlement and angular distortion. (8)

(b) Explain theory of estimation of bearing capacity and foundation settlement in soil based on SPT data. (10)

(c) Explain briefly the significance of Schmertmann's equation for estimation of settlement (7)

Q-3. A RCC raft foundation 10 m wide and length 14 m has to be constructed in a sub soil as shown in Fig-2. How many storied multistoried RCC building may be constructed in proposed site with one basement floor for car parking.

EGL----------

C= 4.0 t/m$^3$ , $\gamma$ = 1.89 t /m$^3$ $M_v$ = 0.0036 m$^2$ / t Grey silty clay

15.0 m ----------

Sandy Silt N= 20-30

**Fig-2**

(b) Determine the degree of compensation of raft. (18)

(c) Describe Skempton's equation for estimation of bearing capacity. (7)

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# B. CONSTRUCTION ENGINEERING 3RD YEAR 2ND SEMESTER EXAM. 2022

## SUBJECT: FOUNDATION ENGINEERING

## Part - II

**Full Marks : 50**

**Answer Q.1 and any ONE from Q.2 and Q.3**

<table>
<tr><th></th><th>No. of Questions</th><th></th><th>Marks</th></tr>
<tr><td>CO4</td><td>Q.1a)</td><td>Determine the safe vertical load carrying capacity of a bored cast-in-situ pile for the soil stratification presented below. State clearly the length of the pile considered.
<table>
<tr><th>Description</th><th>Starting Elevation (m)</th><th>Ending Elevation (m)</th><th>Angle of Internal friction (φ) (Degrees)</th><th>Cohesion ($t/m^2$)</th><th>Bulk Density ($t/m^3$)</th></tr>
<tr><td>Loose brownish grey silty sand</td><td>(-) 0.000 m</td><td>(-) 4.00 m</td><td>28</td><td></td><td>1.750</td></tr>
<tr><td>Medium dense grey silty sand.</td><td>(-) 4.00 m</td><td>(-) 10.00 m</td><td>30</td><td></td><td>1.800</td></tr>
<tr><td>Medium dense/dense greyish brown silty sand</td><td>(-)10.00 m</td><td>(-) 25.50 m</td><td>30</td><td></td><td>1.850</td></tr>
</table>
Groundwater level (-)1.550 m<br>
Pile Diameter 0.500 m<br>
Pile Cut-off Level (-)1.500 m BGL</td><td>15</td></tr>
</table>

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**SUBJECT:** FOUNDATION ENGINEERING

## Part - II

**Full Marks : 50**

**Answer Q.1 and any ONE from Q.2 and Q.3**

| | No. of Questions | | Marks |
|---|---|---|---|
| | | Ground level (-) 0.000 m | |
| | | Assume suitable values of any other relevant data not provided. | |
| | Q.1b) | What is the safe uplift capacity of the pile? | 5 |
| | Q.1c) | Also calculate the safe lateral load capacity of the same pile by IS method. | 10 |
| | Q.2.a) | Write the merits and demerits of pneumatic caissons. | 7 |
| CO5 | Q.2.b) | What is sinking of wells? | 3 |
| | Q.2.c) | Determine the maximum depth of scour from the following data: | 10 |

| Sieve size (mm) | Wt. of soil retained (gm) |
|---|---|
| 4.000 | 0 |
| 2.000 | 15.2 |
| 1.180 | 75.6 |
| 0.425 | 78.9 |
| 0.150 | 151.2 |
| 0.075 | 39.4 |
| Pan | 54.7 |

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## Part - II

**Full Marks : 50**

**Answer Q.1 and any ONE from Q.2 and Q.3**

| | No. of Questions | | Marks |
|---|---|---|---|
| | Q.3.a) | Write a short note on estimating the ultimate load carrying capacity of piles by dynamic formulae explaining the meanings of various terms. | 10 |
| | Q.3.b) | A timber pile 18cm in diameter at the tip and 30cm in diameter at the butt is driven 7.5m into the ground. The weight of the pile and driving cap is 700kg and the weight of the drop hammer, which is released by a trip is 900 kg. The hammer falls through 3m. The average penetration of the pile under the last few blows of the hammer is 1cm. Determine the vertical load carrying capacity of the pile. | 10 |