Code : 011722

B. Tech 7th Semester Exam., 2017

FOUNDATION ENGINEERING

Time : 3 hours   Full Marks : 70

Instructions :

(i) The marks are indicated in the right-hand margin.

(ii) There are **NINE** questions in this paper.

(iii) Attempt **FIVE** questions in all.

(iv) Question No. **1** is compulsory.

1. Define the following terms (any *seven*) :   2×7=14

   (a) Site exploration

   (b) Negative skin friction

   (c) Safe bearing capacity

   (d) Group settlement ratio

   (e) Damping ratio

   (f) Compaction piles

   (g) Ultimate bearing capacity

   (h) Free vibration

   (i) Standard penetration number (N)

   (j) Significant depth

8AK/83   (Turn Over)

(2)

2. Explain in detail the cone penetration test with sketches.   14

3. A strip footing 2 m wide carries a load intensity of 400 kPa at a depth of 1·2 m in sand. The saturated unit weight of sand is 19·5 kN/m^3 and unit weight above water table is 16·8 kN/m^3. If $c = 0$ and $\phi = 35°$, determine the factor of safety with respect to shear failure for the following locations of water table (take $N_c = 0$, $N_q = 41·4$ and $N_\gamma = 42·4$) :   14

   (i) Water table is 4 m below ground level

   (ii) Water table is 1·2 m below ground level

   (iii) Water table is 2·5 m below ground level

   (iv) Water table is at ground level

4. Describe in detail the scope of site investigation and stages of site investigation.   14

5. What are the advantage and disadvantage of (a) plate load test and (b) standard penetration test?   7+7=14

8AK/83   (Continued)

6. A concrete pile of 45 cm diameter is **driven to** a depth of 16 m through a layered system of sandy soil $(c = 0)$. The following data are available :

Top layer 1 :

Thickness = 8 m, γ_d = 16·5 kN/m^3,
$e = 0·60$ and $\phi = 30°$

Layer 2 :

Thickness = 6 m, γ_d = 15·5 kN/m^3,
$e = 0·65$ and $\phi = 35°$

Layer 3 :

Extends to a great depth,
γ_d = 16·00 kN/m^3, $e = 0·65$ and $\phi = 38°$

Assume that the value of δ in all the layers of sand is equal to $0·75\phi$. The value of $\overline{K}_s$ for each layer is equal to half of the passive earth pressure coefficient. The water table is at ground level. Calculate the values of Q_u and Q_a with $F_s = 2·5$ by the conventional method for Q_f and Berezantsev's method for Q_b. 　　14

7. What are different types of shear failure in foundation? 　　14

8. Determine the expression of coefficient of elastic uniform shear, $C\tau$ in terms of resonant frequency for the block of size 1·5 m × 0·75 m × 0·70 m high, tested under horizontal vibrations. 　　14

9. What is the difference between (a) caisson and pile, and (b) swelling potential and swelling pressure? 　　7+7=14

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