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Total No. of Pages : 3

Seat No.	
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T.E. (Civil) (Semester - VI)
Examination, April - 2017 (Revised)
GEOTECHNICAL ENGINEERING - II
Sub. Code : 66874

Day and Date : Friday, 28 - 04 - 2017
Time : 2.00 p.m. to 5.00 p.m.

Total Marks : 100

- Instructions :**
- 1) All questions are compulsory.
 - 2) Figures to the right indicate full marks.
 - 3) Make assumptions wherever necessary.
 - 4) Use of non-programmable calculator is allowed.

SECTION - I

Q1) Solve any three from following: [18]

- a) List various types of samplers used in soil exploration. Explain any one with sketch.
- b) List and explain types of rock failure.
- c) List types of bearing capacity failure of soil. Explain any one with sketch.
- d) List and explain corrections applied to standard penetration test number (N).

Q2) Solve any two from following: [16]

- a) Explain pressure meter test for determination of bearing capacity.
- b) A 4 m wide foundation is located at a depth of 1.5 m from the ground surface in loose sand. The relevant properties of sand are angle of internal friction 32° , unit weight in dry state 16 kN/cu.m. Determine the net safe bearing capacity adopting factor of safety 2 by I.S. code method analysis. Bearing capacity factors are

Angle of internal friction	N_c	N_q	N_r
22	16.88	7.82	7.13
23	18.05	8.66	8.20
32	35.49	23.18	30.22
33	38.64	26.09	35.19

- c) Derive equation for ultimate bearing capacity of soil by Terzaghi's analysis for strip foundation.

P.T.O.

Q3) Solve any two from following:

- a) List and explain types of shallow foundations with suitability of each.
 b) Design a rectangular combined foundation for following data:

Column	Size	Load	Remark
A	0.30 × 0.30 m	1500 kN	C/c distance between columns is 5.0 m and safe bearing capacity of soil is 150 kN/m ²
B	0.30 × 0.30 m	1200 kN	

- c) A soft normally consolidated clay layer is 5 m thick with a natural water content of 25%. The clay has a saturated unit weight of 17.1 kN/cu.m, Sp gravity of soil solids 2.65 and a liquid limit of 45%. The ground water level is at the surface of the clay. Determine the settlement of the foundation if the foundation load will subject the center of the clay layer to a vertical stress increase of 10 kN/sq.m.

SECTION - II

SECTION - II

Q4) Solve any three from following:

[18]

- a) What is negative skin friction? What are the various causes of negative skin friction? How it can be Estimated.
 b) Explain with neat sketch under reamed piles its construction and precautions.
 c) A concrete pile weighing 35 kN is driven by a drop hammer weighing 50 kN and having an effective fall of 1.0 m. The average set per blow is 15 mm. The total temporary elastic compression is 20 mm. Assume the coefficient of restitution as 0.30 and a factor of safety of 2.0, determine the allowable load for pile using Hilery's formula.
 d) A 200 mm diameter, 8 m long piles are used as foundation for a column in uniform deposit of medium clay having unconfined compression strength = 100 kN/m² and adhesion factor = 0.9. There are nine piles arranged in a square pattern of 3 × 3. For a group efficiency = 1, find the spacing between the piles (Neglect bearing)

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[16]

Q5) Solve any two from following:

- a) What are the different shapes of foundation wells and what are their comparative merits and demerits?
- b) Write the use of pneumatic caissons. What is a caisson disease and how can it be prevented?
- c) Write the different types of sheet pile and their suitability.

Q6) Solve any two from following:

[16]

- a) Explain the Swedish slip circle method for the analysis of purely cohesive soil?
- b) Explain geosynthetic materials and its application in Civil Engineering.
- c) A 8 m deep canal has side slope of 1.5 H: 1V. The properties of soils are $c = 24.5 \text{ kN/m}^2$, $\phi = 14^\circ$, $e = 0.8$ and $G = 2.7$. Determine the factor of safety w.r.t. cohesion, against failure of the slope when the water level goes down suddenly. Given for $i = 34^\circ$, stability number (S_n) are:

ϕ	6	7	14
S_n	0.122	0.116	0.074

x x x