

TCE-603

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Even Semester Examination - 2017

B.TECH. (VI SEMESTER)

FOUNDATION ENGINEERING

Time: 03:00 Hours

Max Marks : 100

Note: Attempt all questions, the marks assigned to each question is indicated at question itself.

Q1. Attempt any **FOUR** questions **[4 x 5]**

- (i) Define the Area ratio for a soil sampler?
- (ii) What are the factors affecting bearing capacity of soil?
- (iii) Differentiate between general and local shear failure.
- (iv) What are the different types of raft foundation?
- (v) List out various boring methods and explain wash boring in detail.

Q2. Attempt any **FOUR** questions **[4 x 5]**

- (i) Explain Coulomb's wedge theory.
- (ii) Explain active and passive earth pressure.

- (iii) Write a note on under reamed pile.
- (iv) What is the effect of water table on bearing capacity of soil?
- (v) Compute the intensities of active and passive earth pressure at depth of 8 meter in dry cohesion-less sand with an angle of internal friction of 30° and unit weight of 18kN/m^3 .

Q3. Attempt any **TWO** questions **[2x 10]**

- (i) What are the various forces acting on well? Explain in detail.
- (ii) How to calculate bearing capacity of soil using Standard Penetration Test (SPT)? Also explain the procedure to perform test in the field.
- (iii) A strip footing 2 m wide carries a load intensity of 400kN/m at a depth of 1.2 m in sand. The saturated unit weight of sand is 19.5kN/m^3 and unit weight above water table is 16.8kN/m^3 . The shear strength parameters are $c=0$ and $\phi = 35^\circ$. Determine the factor of safety with respect to shear failure for the following cases of location of water table:

- a) Water table is 4 m below G.L.
- b) Water table is 1.2 m below G.L.
- c) Water table is 2.5 m below G.L.
- d) Water table is 0.5 m below G.L.
- e) Water table is at G.L. itself.

Use Terzaghi's equations. Take
 $N_c=39.42$, $N_q=41.4$ and $N_\gamma=42.4$

Q4. Attempt any **TWO** questions **[2x 10]**

- (i) What is tilt and shift of a well? How it is rectified.
- (ii) What are the modes of slope failure? Also explain Swedish Slip Circle method
- (iii) A 6 m high vertical wall supports a saturated, cohesive backfill ($\phi=0$) with horizontal surface. The top 3 m of the backfill weights 18kN/m^2 and has an apparent cohesion of 18kN/m^2 . The bulk unit weight and apparent cohesion of the bottom 3 m of the backfill are respectively 20kN/m^3 and 24kN/m^2 . What is the likely depth of tension cracks behind the wall? If tension cracks develop, what will be the total active pressure? Draw the

pressure distribution diagram and determine the point of application of the resultant pressure.

Q5. Attempt any **TWO** questions **[2x 10]**

- (i) Derive an expression for natural frequency of the free vibration system.
- (ii) A group of 9 piles arranged in a square pattern with diameter and length of each pile as 25 cm and 10 cm respectively, is used as a foundation in soft clay deposit. Taking the unconfined compressive strength of clay as 120kN/m^2 and the pile spacing as 100 cm centre to centre. Find the load capacity of the group. Assume the bearing capacity factor $N_c=9$ and adhesion factor $=0.75$. A factor of safety of 2.5 may be taken.
- (iii) Resonance occurred at a frequency of 22 cycles per second in a vertical vibration test of a block $1\text{m}\times 1\text{m}\times 1\text{m}$. Determine the coefficient of elastic uniform in compression of the soil given that the weight of the oscillator is 65 kg and that the force produced by it at 12 cycles per second is 100 kg. Also compute the amplitude in vertical direction at 12 cycles per second.