

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-VIII(NEW) EXAMINATION – SUMMER 2019

Subject Code:2180609

Date:15/05/2019

Subject Name:Foundation Engineering

Time:10:30 AM TO 01:00 PM

Total Marks: 70

Instructions:

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) Answer the following. **03**
- 1 Define: ultimate bearing capacity of soil mass.
 - 2 What is a significant depth?
 - 3 As the cohesion decreases, adhesion increases. (True/False)
- (b) Give the classification of shallow foundations and deep foundations. **04**
- (c) Determine the gross safe load that can be carried out by a square footing of size 2.2 m x 2.2 m, placed at a depth of 1.6 m below ground level. The water table is at a great depth. Foundation soil has the properties: $\gamma_d = 16.5 \text{ kN/m}^3$, $\phi = 20^\circ$, $N_c' = 11.8$, $N_q' = 3.8$, $N_r' = 1.3$. $C = 11 \text{ kN/m}^2$. Assume F.S. = 2.5. **07**
- Q.2** (a) What is the effect of increase in width of a footing on bearing capacity of a footing resting on (a) sand and (b) clay? **03**
- (b) What are the engineering tests usually conducted to assess the swelling potential of an expansive soil. Discuss any one of them. **04**
- (c) What are the objectives of a soil investigation program? List the various methods of soil investigation. What is a bore log? **07**
- OR**
- (c) Differentiate between flexible pavement and rigid pavement. Describe briefly the various methods for design of flexible pavement. **07**
- Q.3** (a) What are the limitations of dynamic pile load formulas? **03**
- (b) Determine the area ratio for the following soil samplers and comment on the nature of the samples obtained. **04**
- (i) Core cutter : 165 mm outer diameter, 150 mm inner diameter.
 - (ii) Seamless tube (Shelby) : 51 mm outer diameter, 48 mm inner diameter.
- (c) Explain the Skempton's analysis for a clayey soil in detail. **07**
- OR**
- Q.3** (a) What are the different circumstances under which a pile foundation is used? **03**
- (b) Comment on the following statements: **04**
1. Settlement of a group of vertical piles is usually more than that of a single pile under equal axial load.
 2. The principal effect of negative skin friction is to reduce factor of safety.
- (c) Write step by step procedure to perform standard penetration test in the field. How it differs from plate load test? **07**
- Q.4** (a) Explain the functions of (i) Batter pile (ii) Fender pile. **03**
- (b) Write assumptions made in the Terzaghi's theory of bearing capacity. **04**
- (c) A square pile group of 9 piles was driven in to soft clay extending to a large depth. The diameter and length of the piles were 30 cm and 9 m respectively. If the unconfined compressive strength of clay is 90 kN/m^2 and pile spacing is 90 cm centre to centre, what is the capacity of the group? Assume F.S. = 2.5 and adhesion factor $\alpha = 0.75$. **07**

OR

- Q.4** (a) Which are the various parameters used for identification of expansive soil? **03**

- (b) Differentiate between diaphragm walls and sheet pile walls. **04**
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- (c) What do you understand by contact pressure? On which factors it depends? Draw contact pressure distribution diagram for flexible and rigid footings on sand and clayey soil. **07**
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- Q.5** (a) Explain the importance of drainage for backfill in retaining wall **03**
(b) Classify the geosynthetic materials and explain any two of them. **04**
(c) What is the 'active zone' in black cotton soil? Explain the properties of black cotton soil. **07**

OR

- Q.5** (a) What are the field conditions that generally favours swelling in an expansive soil? **03**
(b) Draw an under reamed pile with detailed configuration. **04**
(c) Discuss the requirements which must be satisfied for the safe design of a retaining wall. **07**

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