Seat No.: _____ Enrolment No._____

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: γ_d =16.5 kN/m^3, ϕ = 20°, N_c' = 11.8, N_q' = 3.8, N_r' = 1.3. C = 11 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. (i) Core cutter : 165 mm outer diameter, 150 mm inner diameter. (ii) Seamless tube (Shelby) : 51 mm outer diameter, 48 mm inner diameter.	**04**
	(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: 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.	**04**
	(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 α = 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**
	(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**
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**

****