Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI (NEW) EXAMINATION – SUMMER 2024

Subject Code: 3160616 Date:28-05-2024

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.**
4. **Simple and non-programmable scientific calculators are allowed.**

			MARKS
Q.1	**(a)**	Define Retaining wall. Enlist different types of retaining wall with neat sketch.	**03**
	(b)	Classify piles according to method of installation and their load carrying Characteristics	**04**
	(c)	Explain "Types of shear failure of soil" with neat sketches	**07**
Q.2	**(a)**	Define: a) Area ratio b) inside clearance c) outside clearance	**03**
	(b)	Enlist types of boring. Explain wash boring in detail	**04**
	(c)	Elaborate the method to conduct SPT test in the field. Also explain the corrections required.	**07**
		OR	
	(c)	Summarize the salient Features of a good sub soil investigation report	**07**
Q.3	**(a)**	Write a short note on raft Foundation	**03**
	(b)	Calculate the ultimate bearing capacity carried out by a square footing of size 2 m x 2.m, placed at a depth of 1.5 m below ground level. The water table is at a great depth. Foundation soil has the properties: γd =16 kN/m^3, ϕ =20°, Nc' = 11.8, Nq' = 3.8, Nr' = 1.3. C = 10 kN/m^2. Use Terzaghi's Method	**04**
	(c)	Elaborate the method to conduct Plate load test in the field	**07**
		OR	
Q.3	**(a)**	Enlist types of shallow foundation with neat sketch	**03**
	(b)	What is the effect of increase in width of a footing on bearing capacity of a footing resting on (a) sand and (b) clay	**04**
	(c)	A strip footing of width 3m is founded at a depth of 2.2m below the ground surface in a c-ϕ soil having cohesion 30 kN/m^2 and angle of internal friction 32^o. The water table is at a depth of 5m below ground surface. The moist soil above the water table is 17 kN/m^3. Determine the safe bearing capacity and safe load per m length of the footing. Consider factor of safety is 3 and take bearing capacity factor Nc = 57.8, Nq = 41.4 and Nγ = 42.4. Use Terzaghi's Method	**07**
Q.4	**(a)**	What do you mean by pile group efficiency? What are the various formulae to find it	**03**
	(b)	Elaborate the conditions where a pile foundation is more suitable than a shallow foundation	**04**

	(c)	A 30 cm diameter pile, 15 m long, is driven in a deposit of medium Dense sand ($\Phi = 36^{\circ}$,$N\gamma$ =40, Nq =42). The unit weight of sand is 15 kN/m^3. What is allowable load with factor of safety 3? Assume lateral earth pressure coefficient = 0.6.	**07**

OR

Q.4	**(a)**	Define negative skin friction. Also expalin its effect on the pile	**03**
	(b)	Discuss various dynamic formulas for load carrying capacity of pile	**04**
	(c)	A Square pile (3*3=9 piles) are embedded in clayey bed (Cu = 100 kPa). The c/c spacing is kept as 3d. The length and diameter of the pile are 10m and 0.3m respectively. If α = 0.6, calculate the pile group capacity considering it as friction pile group.	**07**
Q.5	**(a)**	Define expansive soil and Collapsible soil	**03**
	(b)	Enlist different function of Geosynthetics and Explain any two in detail	**04**
	(c)	Discuss stability criteria of gravity retaining wall with neat sketch	**07**

OR

Q.5	**(a)**	Write a short note on Geomembrane	**03**
	(b)	What is the ‘active zone’ in black cotton soil? Explain the properties of black cotton soil.	**04**
	(c)	Discuss stability criteria of cantilever retaining wall with neat sketch	**07**

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