Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI EXAMINATION – SUMMER 2025

Subject Code: 3160616 Date:02-06-2025

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)**	State the objectives of reconnaissance survey for exploration of soil.	**03**
	(b)	Describe hydrometer test	**04**
	(c)	Enlist different types of borings for soil exploration of soil and describe any one in detail.	**07**
Q.2	**(a)**	Discuss area ratio, inside clearance, outside clearance with respect to disturbed and undisturbed sample.	**03**
	(b)	Plan the exploration program for projects with following details. Area of plot 6000 m^2 with almost square in shape. There will be 5 high-rise residential frame structure with G + 10.	**04**
	(c)	Describe standard penetration test with necessary corrections.	**07**
		OR	
	(c)	Describe wash boring for sub surface exploration.	**07**
Q.3	**(a)**	Illustrate the water table effects to the bearing capacity of soil with sketch.	**03**
	(b)	Describe general shear failure with sketch.	**04**
	(c)	Determine the safe bearing capacity of the 1.5 m wide strip footing placed at the depth of 1.2 m, in homogeneous sand. The soil properties are C = 0, γ = 18 kN/m^3, Ø = 35°. Take bearing capacity factor N_c, 57.8, = Nq = 41.4, and Nγ =42.4 and Factor of safety 2.5.	**07**
		OR	
Q.3	**(a)**	State Terzaghi's assumptions for bearing capacity analysis.	**03**
	(b)	Describe punching shear failure with sketch.	**04**
	(c)	Plate tests were conducted in C – Ø soil, on plates of two different sizes and the following results were obtained. Find the size of square footing to carry load of 1000 kN at same settlement.	**07**

Load	Size of footings	Settlement
40 kN	0.3 x 0.3 m	25 mm
100 kN	0.6 x 0.6 m	25 mm

Q.4	**(a)**	Differentiate between cast in situ and driven pile.	**03**
	(b)	Describe negative skin friction on pile.	**04**
	(c)	A concrete pile 30 cm in diameter is driven into a medium sand dense sand up to 8 .0 m depth. Estimate the safe load on pile with factor of safety 2.5. Take γ= 21 kN/m^3, K = 1.0, tanδ = 0.70 and critical depth 3 m and Nq = 80.	**07**
		OR	
Q.4	**(a)**	Describe compaction pile with its application.	**03**

	(b)	State the Feld's rule for group efficiency of pile and explain in detail with sketch.	**04**
	(c)	A pile group consists of 9 pile of 300 mm diameter arraigned in 3 x 3 pattern. The center-to-center distance between piles are 750 mm. The depth of pile is 10 m. The soil is having cohesion 80 kN/m^2.	**07**
Q.5	**(a)**	Draw contact pressure diagram for flexible foundation on clay and sand.	**03**
	(b)	State the measures taken to rest foundation in expansive soil.	**04**
	(c)	State the application of Geomembrane in the civil engineering.	**07**

OR

Q.5	**(a)**	Draw contact pressure diagram for rigid foundation on clay and sand.	**03**
	(b)	Differentiate between counter fort wall and cantilever type retaining wall.	**04**
	(c)	State the application of Geogrid in the civil engineering.	**07**

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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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GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI (NEW) EXAMINATION – SUMMER 2023

Subject Code:3160616 Date:18-07-2023

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)**	What is reconnaissance? What type of information is obtained in reconnaissance?	**03**
	(b)	Write short note on: Raft foundation.	**04**
	(c)	Describe the standard penetration test. How the observed N-Value is corrected?	**07**
Q.2	**(a)**	Define following terms (i)Safe bearing capacity (ii) Net ultimate bearing capacity (iii)Foundation	**03**
	(b)	Describe the split spoon sampler. What is its use?	**04**
	(c)	Explain seismic refraction method. What are its limitations?	**07**
		OR	
	(c)	Explain Rankine's theory of bearing capacity and derive the equation for depth of foundation by Rankine's theory.	**07**
Q.3	**(a)**	In which conditions the raft foundation is preferred.	**03**
	(b)	Discuss the various soil samplers used for obtaining undisturbed soil samples.	**04**
	(c)	Describe the static cone penetration test.	**07**
		OR	
Q.3	**(a)**	Draw the sketch of split spoon sampler with all details.	**03**
	(b)	Write short note on: Floating foundation.	**04**
	(c)	Explain pile load test to determine the bearing resistance of pile.	**07**
Q.4	**(a)**	Give name for method to determine the pile capacity	**03**
	(b)	How do you estimate the group capacity of piles in sand and clay?	**04**
	(c)	Define Group efficiency of piles and Explain Feld's rule for group efficiency of piles. Determine the efficiency of group of nine piles (3x3) by Feld's rule.	**07**
		OR	
Q.4	**(a)**	Write a short note on pile driving equipment's.	**03**
	(b)	Give method to determine the pile capacity and explain any one in detail.	**04**
	(c)	Enlist different types of foundations provided in expansive soils and explain any one.	**07**
Q.5	**(a)**	Enlist the situation where pile foundations are preferred.	**03**
	(b)	Explain type of Retaining walls with neat sketches.	**04**
	(c)	Describe various types of piles based on method of installation.	**07**
		OR	
Q.5	**(a)**	Define : 1) free swell index 2) Swelling potential 3) Swelling pressure	**03**
	(b)	Enlist various application areas of geosynthetics.	**04**
	(c)	Discuss stability criteria of cantilever retaining wall.	**07**

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Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI (NEW) EXAMINATION – SUMMER 2022

Subject Code:3160616 Date:14/06/2022

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)**	Enumerate the factors affecting bearing capacity.	**03**
	(b)	Define bearing capacity, gross bearing capacity and net bearing capacity.	**04**
	(c)	Classify the methods of sub-soil exploration and explain in detail Augur boring method.	**07**
Q.2	**(a)**	Differentiate between general shear failure and local shear failure.	**03**
	(b)	Explain about floating foundation with neat sketch..	**04**
	(c)	Determine the safe bearing capacity of a strip footing 2 m wide and 1.5 m depth resting on a dry sand bed. Consider γsand=17.5 kN/m3 and bearing capacity factors Nc= 35.5 Nq= 24.2 , Nγ = 21.0 corresponding to $\phi=37^0$ and FOS=3.	**07**
		OR	
	(c)	Describe plate load test with neat sketches.	**07**
Q.3	**(a)**	Discuss Various correction required in SPT test.	**03**
	(b)	Explain Electrical resistivity method in details.	**04**
	(c)	Determine the area ratio , inside clearance and outside clearance for the following soil samplers and comment on the nature of the samples obtained. (i) Core edge : 77 mm outer & 70 mm inner diameter. (ii) Samping tube: 74 mm outer & 72 mm inner diameter	**07**
		OR	
Q.3	**(a)**	Enlist the various method of pile driving equipment.	**03**
	(b)	Define negative skin friction. What is its effect on the pile?	**04**
	(c)	Explain different function of geo-synthetics in detail with figures.	**07**
Q.4	**(a)**	Explain group action of pile	**03**
	(b)	Write Short note on Under reamed pile.	**04**
	(c)	A square concrete pile 40 cm x 40 cm is driven in to homogeneous sand layer, (ϕ=35, γ=17 kN/m3,) for a depth of 15m. calculate ultimate load . take K= 1.3 and $\delta= 18^0$, Nq=51	**07**
		OR	
Q.4	**(a)**	Explain concept of CNS layer.	**03**
	(b)	Describe Hiley's formula for calculating the ultimate bearing capacity of pile.	**04**
	(c)	Discuss the various types of anchors used for sheet pile wall.	**07**

Q.5	**(a)**	Explain seismic refraction method in details.	**03**
	(b)	Give basic difference between Cantilever and Counter fort retaining wall.	**04**
	(c)	A drop hammer weighing 60 kN and having an effective fall of 0.75m drives an RCC pile weighing 40 kN. The average settlement per blow is 1.6cm. The total temporary elastic compression is 2.0 cm. Determine ultimate bearing capacity and allowable load on pile assuming coefficient of restitution as 0.30 and factor of safety 2.5. Use Hiley's formula.	**07**

OR

Q.5	**(a)**	Discuss the Sheet pile? where it is used?	**03**
	(b)	Write short note on "Guide walls".	**04**
	(c)	What is the "active zone" in black cotton soil? Explain the properties of black cotton soil.	**07**

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