

## GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER-VI EXAMINATION – WINTER 2025

**Subject Code:3160616**

**Date:27-11-2025**

**Subject Name:Foundation Engineering**

**Time:02:30 PM TO 05:00 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**

<b>Q.1</b>	(a) Differentiate between disturbed samples and undisturbed samples.	<b>03</b>
	(b) Explain the factors that affects sample disturbance.	<b>04</b>
	(c) Describe with a neat sketch wash boring method of sub soil exploration. What are its merits and demerits?	<b>07</b>
<b>Q.2</b>	(a) Define the terms: (i) Ultimate bearing capacity, (ii) Net ultimate bearing capacity (iii) Net safe bearing capacity	<b>03</b>
	(b) Differentiate between general shear failure and local shear failure.	<b>04</b>
	(c) Describe the major differences between SPT, SCPT and DCPT	<b>07</b>
	<b>OR</b>	
	(c) The field N-value in a deposit of fully submerged fine sand was 38 at a depth of 5m. The avg. unit weight of sand is 17 kN/m <sup>3</sup> . Calculate corrected SPT value as per IS:2231-1981.	<b>07</b>
<b>Q.3</b>	(a) Define negative skin friction .How it affects the capacity of pile?	<b>03</b>
	(b) Write short note on under reamed pile.	<b>04</b>
	(c) A Circular footing of 2.5 m dia. Placed at a depth of 2m in a pure clay with an unconfined compressive strength of 140 kN/m <sup>2</sup> , $\phi = 0$ , and $\gamma = 16.5$ kN/m <sup>3</sup> . Determine the ultimate bearing capacity and safe bearing capacity . Assume Terzaghi's factors are $N_c=5.14$ , $N_q=1$ , $N\gamma =0$ and FOS = 3.	<b>07</b>
	<b>OR</b>	
<b>Q.3</b>	(a) Draw a sketch of Split spoon sampler with notations.	<b>03</b>
	(b) Write short note on pile driving equipments.	<b>04</b>
	(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 $\gamma_{sand} = 18$ kN/m <sup>3</sup> and bearing capacity factor $N_c=35.5$ , $N_q=20.5$ , $N\gamma =21$ corresponding to $\phi = 37$ . Take FOS = 3.	<b>07</b>
<b>Q.4</b>	(a) Describe the swell test.	<b>03</b>
	(b) Explain application of Geo-synthetics in roads.	<b>04</b>
	(c) Determine the Safe load carrying capacity of a driven pile of 300mm dia and 8m length. In a medium dense to dense sand having $\phi = 35^0$ , $\gamma = 20$ kN/m <sup>3</sup> , $\gamma' = 11$ kN/m <sup>3</sup> and water table at 3m below GL. Take FOS= 2, k=2, $\tan\delta = 0.5$ $N_q=60$ .	<b>07</b>

**OR**

**Q.4** (a) Define: (i) Free swell index (ii) Swelling potential **03**  
(b) Write short note on Drilled pier foundation **04**  
(c) A drop hammer of 50 kN weight having an effective fall of 0.75m drives an RCC pile of 30 kN. The avg. penetration per blow is 15 mm. The total elastic compression is 20 mm. Assuming the  $e=0.20$  and FOS is 2.5, Determine the ultimate bearing capacity and allowable load on pile. Use Hiley's Formula. **07**

**Q.5** (a) Write short note on Group action and efficiency of pile group. **03**  
(b) Discuss various types of anchors used for sheet pile wall. **04**  
(c) Give classification of Geo-synthetics. Describe basic function of Geo-synthetics. **07**

**OR**

**Q.5** (a) Write short note on Soldier piles and laggings. **03**  
(b) Enlist types of retaining wall and explain any one in details. **04**  
(c) Explain the procedure of Plate load test in details with neat sketch. **07**

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