

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE - SEMESTER-VIII EXAMINATION – SUMMER 2020****Subject Code: 2180609****Date: 27/10/2020****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.

		<b>MARKS</b>
<b>Q.1</b>	(a) Define following terms; Bearing capacity, Ultimate bearing capacity, Safe bearing capacity	<b>03</b>
	(b) Enlist the objectives of site exploration program.	<b>04</b>
	(c) Describe the standard penetration test used in soil exploration, with neat diagram. Comment on the correction factor for N- values for the dry sand and submerged fine sand.	<b>07</b>
<b>Q.2</b>	(a) What are the assumptions made in the derivation of Terzaghi's bearing capacity theory? Write the equation for the ultimate bearing capacity.	<b>03</b>
	(b) Explain the design criteria for satisfactory performance of foundation.	<b>04</b>
	(c) Determine the net allowable load and gross allowable load for a square footing of 1.75m side and 1.25m deep. The soil below having; $\gamma=16\text{kN/m}^3$ , $c'=18\text{ kN/m}^2$ & $\phi'=25^\circ$ . Take factor of safety =3 & use Terzaghi's theory. The values of $N_c'=14.8$ , $N_q'=5.6$ , $N_\gamma'=3.2$ for $\phi'=25^\circ$ .	<b>07</b>
	<b>OR</b>	
	(c) Enlist the factors affecting bearing capacity. Explain each factor in detail.	<b>07</b>
<b>Q.3</b>	(a) Describe limitations of plate load test.	<b>03</b>
	(b) Explain Feld's rule for the efficiency of pile grouped with 3, 4, 5 & 6 piles.	<b>04</b>
	(c) Draw neat sketch of gravity retaining wall with forces acting on it. Discuss various stability checks for gravity retaining wall.	<b>07</b>
	<b>OR</b>	
<b>Q.3</b>	(a) Differentiate between general shear failure and local shear failure with neat sketch.	<b>03</b>
	(b) Differentiate between the end bearing pile and friction pile.	<b>04</b>
	(c) Why drainage in backfill of retaining wall is provided? Explain different methods of providing drainage of retaining wall.	<b>07</b>
<b>Q.4</b>	(a) Discuss the characteristics of the expansive soils.	<b>03</b>
	(b) Enlist the factors influencing the selection of piles.	<b>04</b>
	(c) A group of 9 piles, 9m long is used as the foundation of column. The piles are 30cm in diameter with centre to centre spacing 90cm. the subsoil consists of clay with unconfined compressive strength $170\text{kN/m}^2$ . Estimate safe load. Take factor of safety = 3, $\alpha = 0.55$ & $N_c = 9$ .	<b>07</b>

**OR**

- Q.4 (a) Explain differential free swell test for identification of expansive soils. **03**
- (b) What is Negative skin friction? What is its effect on the pile? **04**
- (c) A square concrete pile 30cm x 30cm is driven into homogeneous sand layer, ( $\phi=30^\circ$ ,  $\gamma=18 \text{ kN/m}^3$ ) for a depth of 12 m. calculate the ultimate load. Take  $K=1.3$ ,  $\delta=18^\circ$ ,  $N_q=29$  & Critical depth = 15B. **07**
- Q.5 (a) Define geosynthetics. Enlist the major types of geosynthetics. **03**
- (b) Write short note on bentonite slurry. **04**
- (c) Explain different functions of geosynthetics, with neat sketches. **07**
- OR**
- Q.5 (a) Explain different foundations systems of expansive soils. **03**
- (b) What is retaining wall? In which situations it is necessary? **04**
- (c) Describe measures required for treatment of expansive soils. **07**

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