Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

PDDC - SEMESTER–V • EXAMINATION – WINTER • 2014

Subject Code: X50603 **Date: 04-12-2014**

Subject Name: Foundation Engineering

Time: 10:30 am - 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. **Use of Programmable calculator is strictly prohibited**
5. **Draw neat sketch wherever necessary**

Q.1 Choose the correct answer from the following: **14**

(i) According to Rankine formula, the minimum depth of foundation when q = 180 kN/m^2, γ = 20kN/m^3 and Ø = 30° is _____
(a) 0.50m (b) 0.75m © 1.0m (d) 2.0m

(ii) For an undisturbed sample, the area ratio of the samples should be
(a) zero (b) 10% or less (c) 10% to 20% (d) more than 20%

(iii) If the actual value of the standard penetration number (N) is greater than 15 for fine sands below water table, the corrected value of N is
(a) 15 + ((N+15)/2)) (b) 15 - ((N+15)/2))
© 15 + ((N-15)/2)) (d) 15 + ((15 - N)/2))

(iv) A shallow foundation is usually defined as a foundation which has
(a) depth less than 0.6m (b) depth less than its width
(c) depth less than 1.0m (d) none of above

(v) If the gross bearing capacity of strip footing 1.5m wide located at a depth of 1m in clay is 400 kN/m^2, its net bearing capacity for γ = 20kN/m^2 is
(a) 370 kN/m^2 (b) 380 kN/m^2 (c) 390 kN/m^2 (d) 360 kN/m^2

(vi) The allowable soil pressure for foundation in cohesive soil is generally controlled by
(a) settlements (b) bearing capacity
(c) both (a) and (b) (d) neither (a) nor (b)

(vii) The under-ream pie is best suitable for which type of soil?
(a) Black cotton soil (b) sandy soils
(c) Silty-Clayey soils (d) none of these

Q.2 (a) A 350mm dia pile, 14 m long is driven into a sand deposit. The details of the hammer are as follows **07**
(1) total weight of hammer = 25 kN
(2) Length of stroke = 100 cm
(3) Average penetration per blow = 5mm
Estimate ultimate resistance of pile using Hiley's formula, assuming that driving is without dolly. Thickness of cushion is 3.0 cm. Assume other data if necessary.

(b) What do you understand by bearing capacity? Differentiate between net safe bearing capacity and gross safe bearing capacity. Enlist the various analytical methods to determine bearing capacity of soil and define over burden pressure. **07**

OR

(b) Explain factors affecting bearing capacity in detail and state the various assumptions made in Terzaghi's theory. **07**

Q.3	**(a)**	Determine the ultimate bearing capacity of strip footing 2.0m wide, and having the depth of foundation 3m. Use Terzaghi's theory and assume general shear failure. Take Ø' = 32°, γ = 17.5kN/m^3, and c' = 12kN/m^2	**07**
	(b)	A strip footing of 2.5m width is founded at a depth of 3m below the ground surface. Determine the net ultimate bearing capacity using (a) Skempton's equation (b) IS code. Take soil parameters Ø = 0 and c = 15 kN/m^2, γ = 18.45kN/m^3. Take N_c= 5.7, N_q = 1, N_γ = 0	**07**

OR

Q.3	**(a)**	A concrete pile, 40cm diameter, is driven into a medium dense sand (Ø =37°, γ = 20.8kN/m^3, K = 1.0, tanδ = 0.7) for a depth of 14m, estimate the safe load if the water table rises to 4m below the ground surface. Take γ_w = 10 kN/m^3	**07**
	(b)	Explain plate load test in detail with neat sketch. Also discuss its limitations.	**07**
Q.4	**(a)**	Discuss the various types of foundation settlement under loads and also state various causes of settlement	**07**
	(b)	A precast concrete pile of size 450mm x 450mm is to be driven into stiff clay. The unconfined compressive strength of the clay is 165 kN/m^2. Determine the length of pile required to carry a safe working load of 400 kN with factor of safety is 2.5.	**07**

OR

Q.4	**(a)**	Define SPT value. Explain the corrections applied to SPT value with engineering reasons.	**07**
	(b)	What are the characteristics of expansive soil? Explain the installation of foundation on such soil. Also give its codal provisions.	**07**
Q.5	**(a)**	Enlist and explain types of geosynthetics with its detail application.	**07**
	(b)	Write a detail note on various methods of modification of an expansive soil for improving its characteristics. In Gujarat for Bharuch region where black cotton soil is found to great depths, suggest any one method for its modification.	**07**

OR

Q.5	**(a)**	What do you understand by site investigation? What are the different purposes for site investigation?	**07**
	(b)	Enlist various type of soil samplers for obtaining undisturbed sample and explain any one in detail.	**07**

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