Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI • EXAMINATION – WINTER 2013

Subject Code: 160606 **Date: 09-12-2013**

Subject Name: Geotechnical Engineering II

Time: 02.30 pm - 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. **Draw neat sketch wherever necessary.**

Q.1	**(a)** **(i)**	Write the basic principles involved in the geophysical methods of subsurface soil exploration	**03**
	(ii)	A cutting is to be made in clay for which the cohesion is 35 kN/m^2 and $\phi = 0^0$, γ= 20 kN/m^3. Find maximum depth for a cutting of side slope 1.5 to 1.0. if the factor of safety is 1.5. The stability number for 1.5 to 1.0 slope and $\phi = 0^0$ is 0.17.	**04**
	(b) **(i)**	A standard penetration test is conducted at a depth of 5 m in a saturated fine sand. If the observed N value is 25, then the equivalent restraint value is _____.	**03**
	(ii)	Comment on the following statements (Any Two). (i) Taylor's Stability Number is applicable to cohesion less soil only. (ii) If the angle of slope is greater than angle of friction, slope is always stable. (iii) Settlement of a pile group is more than the settlement of an individual pile.	**04**
Q.2	**(a)**	Determine the net allowable load and gross allowable load for a square footing of 2m x 2m size with a depth of foundation of 1.0 m. Assume local shear failure . Use Terzaghi's theory. Soil properties are: γ= 18 kN/m^3, c'= 15 kN/m^2, For $\phi' = 25^0$ $N_{c'}$ =14.8, $N_{q'}$= 5.6, $N_{\gamma'}$ =3.2, F.S=3.0.	**07**
	(b)	Write the assumptions made in the Terzaghi's baring capacity theory. Also draw its different failure zones.	**07**
		OR	
	(b)	Define contact pressure. Which factors affect content pressure distribution? Draw contact pressure diagram for rigid footing on clay and sand.	**07**
Q.3	**(a)**	Write major points of difference between the following. (i) Active earth pressure and passive earth pressure. (ii) Standard penetration test and plate load test.	**08**
	(b)	Explain the Rankine's theory for active earth pressure in cohesive soil.	**06**
		OR	
Q.3	**(a)**	Differentiate between the following. (i) Strip footing and strap footing. (ii) Skin resistance and tip resistance.	**08**
	(b)	Explain the methods to reduce foundation settlement	**06**
Q.4	**(a)**	A smooth backed vertical wall is 6.3 m high and retains a soil with a bulk unit weight of 18 kN/m^3 and $\phi = 18^0$. The top of the soil is level with the top of the wall and is horizontal. If the soil surface carries a uniformly distributed load of 4.5 kN/m, determine the total active thrust on the wall per meter length of the wall and its point of application.	**07**
	(b)	Discuss various dynamic formula for load carrying capacity of pile with their limitations.	**07**
		OR	
Q.4	**(a)**	Classify the piles according to their function .	**07**

(b) A 4 m high vertical cut retains the cohesive soil backfill. The soil properties are : : γ= 18 kN/m^3 ϕ' = 12^0 c'= 20 kN/m^2 Determine the stress intensity at top and bottom of the cut ,depth of tension crack and maximum depth of unsupported excavation. **07**

Q.5 **(a)** Design a square pile group to carry 400 kN load in clay with an unconfined compressive strength of 60 kN/m^2. The piles are 30 cm diameter and 6 m long. Adhesion factor α = 0.6, F.S. =3. **07**

(b) Derive the expression for the factor of safety of an infinite slope in a dry cohesion less soil. **07**

OR

Q.5 **(a)** Illustrate the procedure for plotting an isobar of intensity 0.1 Q. Also draw Isobar diagram. **07**

(b) What are the basic modes of failure of earth slopes? What are the remedial measures to prevent failure of earth slopes? **07**

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