Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

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

Subject Code:3150615 Date:13/06/2022

Subject Name:Soil Mechanics

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
Q.1	**(a)**	Describe Various types of Failure with sketch.	**03**
	(b)	What do you mean by site investigation? What are the different purposes of site investigation?	**04**
	(c)	Write step by step procedure to perform standard penetration test in the field. Also explain corrections for SPT value?	**07**
Q.2	**(a)**	Enlist different types of factor of safety used in stability of slopes.	**03**
	(b)	Define following terms in relation to tri-axial test (i) Confining pressure (ii) Deviator stress (iii) major and minor principal stress	**04**
	(c)	An Embankment 13 m high is inclined at 30^0 to the horizontal. A stability analysis by the method of slice gives the following forces per running meter. Sum of shearing forces = 600 kN. Sum of Normal forces = 1000 kN. Sum of neutral forces= 200 kN. The length of arc is 35 m. the value of effective stress parameter are 30 kN/m^2 and 25^0 resp. Determine the FOS w.r.t. (a) shearing strength (b) Cohesion.	**07**
		OR	
	(c)	How a slope is analyzed using Swedish circle method? Derive an expression for factor of safety.	**07**
Q.3	**(a)**	What are the advantages and disadvantages of Tri-axial Compression Test?	**03**
	(b)	Define negative skin friction. What is its effect on the pile?	**04**
	(c)	Two identical specimens 3.8 cm in dia. and 7.6 cm height were tested in tri-axial test under un-drained conditions. The first specimen failed at an axial load of 75 kg under a cell pressure of 1 kg/cm^2. The second specimen failed at on axial load of 95 kg under a cell pressure of 2 kg/cm2. Determine the value of cohesion and angle of shearing resistance.	**07**
		OR	
Q.3	**(a)**	Write short note on Newmark's influence chart.	**03**
	(b)	Describe Terzaghi's theory of bearing capacity of foundation soil under strip footing. What are the assumptions and its limitations?	**04**
	(c)	What is Unconfined compression test? Explain the procedure with neat sketch and write its advantages over a tri-axial test.	**07**

Q.4	**(a)**	Write short note on Floating Foundation.	**03**
	(b)	Enumerate factor affecting bearing capacity of soil .	**04**
	(c)	A 2.5 m wide strip footing is founded at a depth of 2.0 m below the ground level in a homogeneous bed of sand , having the following properties: Φ= 35º, γ = 18.0 kN/m^3. Determine the ultimate, net ultimate and net safe bearing capacity of the footing. For Φ= 35º Nc= 57.8, Nq= 41.4,Nγ = 42.4. Assume a factor of safety of 3.0 Use Terazaghi's analysis. Water table is at 2 m from G.L.	**07**

OR

Q.4	**(a)**	Differentiate between general shear failure and local shear failure.	**03**
	(b)	Explain how expansive soil can be identified in the laboratory?	**04**
	(c)	Determine the safe bearing capacity of a square footing 2.0 m x 2.0 m located at a depth of 1 m below ground level in a soil of density 17.5 kN/m3 , Φ= 30º (Nc= 30.4, Nq= 18.4, Nγ = 22.4) if the water table rises upto G.L. what is reduction in SBC. Take FOS=3.	**07**

Q.5	**(a)**	Enlist different pile driving hammers. Explain any two in detail.	**03**
	(b)	Write Short note on Under reamed pile.	**04**
	(c)	A group of 16 piles of 0.45 m diameter is arranged in a square pattern with centre to centre spacing of 1.5 m. The piles are 10 m long and embedded in soft clay with cohesion 30 kN/m². Bearing resistance may be neglected for the piles. Adhesion factor is 0.6. Determine the ultimate load capacity of pile group.	**07**

OR

Q.5	**(a)**	Write dynamic formulae to estimate pile capacity.	**03**
	(b)	Classify geo-textile materials. What are the basic functions performed by geotextiles?	**04**
	(c)	A concrete pile, 35 cm diameter, 15 m long is driven through a 6 m thick layer of silty sand (ϕ=25,γ =18 kN/m3)overlaying a dense layer of sand (ϕ=40, γ =16.5 kN/m3). If the water table is at great depth, estimate the safe load the pile can carry Take F.S. =3, k=1.0, and δ=0.75ϕ. (Nq= 140 for ϕ=40)	**07**

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