Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

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

Subject Code:3150615 Date:13-01-2023

Subject Name:Soil Mechanics

Time:10:30 AM TO 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. **Simple and non-programmable scientific calculators are allowed.**

Q.1	**(a)**	Answer the following. (Write full sentence)	**03**
	1	Pore pressure coefficient B is a function of (a) Over consolidation ratio (b) Degree of saturation (c) Under consolidation ratio (d) None of the above	
	2	Undisturbed samples are obtained by (a) Direct excavation (b) Augurs (c) Thick wall sampler (d)Thin wall sampler	
	3	The foundation whose length is considerably greater than its width, is called (a) Strip footing (b) Strap footing (c) Isolated footing (d) Combined footing	
	(b)	Give the comparison of Boussinesq and Westergaard theory for stress distribution analysis.	**04**
	(c)	Determine the allowable gross load and net allowable load that can be carried out by a square footing of size 2 m x 2 m , placed at a depth of 1.0 m below ground level. The water table is at a great depth. Foundation soil has the properties: γ_d =18 kN/m^3, C = 15 kN/m^2. Use Terzaghi's theory. For ϕ = 25°, N_c' = 14.8, N_q' = 5.6, N_γ' = 3.2 Assume F.S. = 3.	**07**
Q.2	**(a)**	What are the basic requirement of a good pavement?	**03**
	(b)	What is a stress path? Draw stress path for foundation loading and unloading condition.	**04**
	(c)	Explain Swedish circle method of slice for stability of slope.	**07**
		OR	
	(c)	Derive the expression for the factor of safety of an infinite slope in a cohesionless soil.	**07**
Q.3	**(a)**	Answer the following. (Write full sentence)	**03**
	1	Newmark's influence chart can be used for the determination vertical stress under (a) Circular load area only (b) Rectangular load area only (c) Strip load only (d) Any shape of the loaded area	
	2	In-situ Vane shear test is used to measure the shear strength of (a) Soft clayey soil (b) Sandy soil (c) Gravelly soil (d) All types of soil	
	3	The ultimate bearing capacity is well defined in (a) Local shear failure (b) Punching shear failure (c) General shear failure (d) Settlement failure	
	(b)	A vertical cut is made in a clay deposits. The soil properties are C= 30 kN/m^2, Ø = 0°, γ = 16 kN/m^3. Find he maximum height of the cut which can be temporarily supported. Take S_n = 0.261.	**04**
	(c)	Explain the corrections involved in Standard Penetration Test.	**07**

OR

Q.3 **(a)** Answer the following. (Write full sentence) **03**

1 Elastic shock waves have different velocities in different material is the principle involved in

(a) Electrical resistivity method (b) Seismic refraction method

(c) Both (a) and (b) (d) Pressure meter method

2 The function which is not served by geotextile material is

(a) Filtration (b) Drainage

(c) Reinforcement (d) Dynamic loading

3 If the angle of friction is greater than angle of slope, the slope is always stable. (True/False)

(b) A long strip footing of width 2 m carries a load of 400 kN/m. Calculate the maximum stress at a depth of 5 m below the centre line of footing. **04**

(c) Discuss step by step procedure to perform Tri axial shear test in the laboratory. **07**

Q.4 **(a)** " The settlement of a group of pile is more than the settlement of a single pile." Comment on the statement. **03**

(b) What are the different methods to improve slope stability? **04**

(c) An unconfined compression test was conducted on an undisturbed clay sample. The sample had a diameter of 37.5 mm and 80 mm long. The load at failure measured by proving ring was 28 kN and the axial deformation of the sample at failure was 13 mm. Determine the unconfined compressive strength and un drained shear strength of the clay. **07**

OR

Q.4 **(a)** Answer the following. (Write full sentence) **03**

1 The piles which are used to protect water front structures are called

(a) Load bearing piles (b) Sheet piles

(c) Tension piles (d) Fender piles

2 Negative skin friction is predominant in

(a) Friction piles in sand (b) Friction piles in soft clay

(c) Piles resting on hard soil (d) Bearing pile

3 The group efficiency of driven piles in sand at a close spacing may be

(a) Equal to 100% (b) Greater than 100%

(c) Well below 100% (d) Can not be said

(b) Explain the effect of water table on bearing capacity of soil. **04**

(c) Discuss various dynamic pile formulae with meaning of each term in it. What are their limitations? **07**

Q.5 **(a)** Explain the Feld rule to determine efficiency of a pile group. **03**

(b) Write the functions of geosynthetic materials and explain any one of them. **04**

(c) A pile group consists of 9 piles of 30 cm diameter and 10 m length driven in clay. The soil properties are C_u = 100 kN/m^2, γ = 20 kN/m^3. Calculate the safe load for the pile group. Take factor of safety = 3 and α = 0.6. **07**

OR

Q.5 **(a)** Name important hydraulic and mechanical properties of geosynthetic materials. **03**

(b) Draw an under reamed pile with detailed configuration. **04**

(c) Explain pile load test for determining load carrying capacity of a pile with neat and clean sketch. **07**

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