GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER–III (NEW) EXAMINATION – SUMMER 2024

Subject Code:3130606　　　　　　　　　　　　　**Date:16-07-2024**

Subject Name: Geotechnical Engineering

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.**

			MARKS
Q.1	**(a)**	Define the following terms. 1. Void ratio 2. Degree of saturation 3. Water content	03
	(b)	Derive the relation between $\gamma_b = \frac{(G+se)\gamma_w}{(1+e)}$	04
	(c)	A soil sample has porosity of 45%, with specific gravity 2.7. Calculate (A) void ratio (B) dry density (C) unit weight of soil if soil is fully saturated.	07
Q.2	**(a)**	In the sieve analysis test 60% soil retains on 4.75 mm sieve. If the value of $D_{10=}$ 0.115, D_{30}= 0.53, and D_{60} = 1.55 respectively, classify the soil.	03
	(b)	Ilustrtae the hydrometer test for grain size analysis of fine grain soil.	04
	(c)	Describe laboratory falling head permeability test.	07
		OR	
	(c)	Describe laboratory standard proctor test.	07
Q.3	**(a)**	Differentiate between UU and CU test.	03
	(b)	Describe honeycombed structure of soil.	04
	(c)	A sample of dry cohesionless soil was tested in a triaxial test at confining pressure of 100 kN/m^2. If the angle of shearing resistance was 36°, determine the deviator stress.	07
		OR	
Q.3	**(a)**	State the limitations of Direct shear test	03
	(b)	Describe flocculated structure of soil.	04
	(c)	A cylindrical soil sample failed at 140 kN/m^2 in an unconfined compression test. The failure plane makes an angle of $54°$ with horizontal. Determine the shear parameters.	07
Q.4	**(a)**	Describe friction circle method.	03
	(b)	Illustrate Isobar diagram.	04
	(c)	A retaining wall with vertical back and 6.0 m in height supports cohesionless soil up to full heights. It also carries udl of 27 kN/m^2. If the unit weight of soil is 17.5 kN/m^3, and angle of internal friction is 30°, calculate pressure intensity at base, total horizontal thrust with its location.	07
		OR	
Q.4	**(a)**	Describe Swedish circle method.	03
	(b)	Illustrate NEWMARK'S influence chart.	04
	(c)	A 5 m high retaining wall supports cohesive soil. The soil properties are c = 5 kN/m^2, γ = 17 kN/m^3, and Ø = 30°. Determine pressure at top, depth of tension crack, unsupported height, and pressure intensity at base.	07

Q.5 **(a)** Differentiate between General and Local shear failure. **03**
(b) Provide detail classification of pile. **04**
(c) Enlist assumption made by the Terzaghi in the theory of consolidation. **07**

OR

Q.5 **(a)** State the effects of water table on bearing capacity of soil. **03**
(b) Differentiate between End bearing pile and friction pile. **04**
(c) Describe spring analogy methods for consolidation. **07**

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