Enrollment No: _____ Exam Seat No:_____

C. U. SHAH UNIVERSITY

Winter Examination-2019

Subject Name : Geotechnical Engineering - I

Subject Code :4TE05GTE1 **Branch: B.Tech (Civil)**

Semester : 5 **Date : 21/11/2019** **Time : 10:30 To 01:30** **Marks : 70**

Instructions:

(1) Use of Programmable calculator & any other electronic instrument is prohibited.
(2) Instructions written on main answer book are strictly to be obeyed.
(3) Draw neat diagrams and figures (if necessary) at right places.
(4) Assume suitable data if needed.

Q-1 **Define the following:** **(14)**

1) Peat
2) Silt
3) Aeolin soil
4) Colluvial soil
5) Laterites
6) Loam
7) Specific gravity
8) Relative density
9) Uniformity coefficient
10) Coefficient of curvature
11) Flocculent structure
12) Dispersed structure
13) Honeycomb structure
14) Shrinkage limit

Attempt any four questions from Q-2 to Q-8

Q-2 **Attempt all questions** **(14)**

(a) Explain how soils are classified using unified soil classification. **07**

(b) A sample of wet soil has a weight of 360 N and a volume of 0.019 m^3. If the samples are drying out the soil in an oven its weight reduces to 315 N. Calculate the following: **07**

(a) bulk unit weight (b) water content (c) void ratio (d) porosity (e) degree of saturation (f) dry unit weight. Take the specific gravity of soil 2.65.

Q-3 **Attempt all questions** **(14)**

(a) Two soils Soil A and Soil B are tested in the laboratory for the consistency limits. The results are as follow: **08**

	Soil A	Soil B
Plastic limit	20 %	22 %
Liquid limit	40 %	58 %
Flow Index	11	6
Water content	41 %	48 %

From the test results calculate its properties and give the answer of following questions:

1) Which soil is more plastic?
2) Which soil is better foundation material when remoulded?
3) Which soil has better strength as a function of water content?
4) Which soil has better strength at the plastic limit?

(b) Write a short note on "quick condition" **06**

Q-4 **Attempt all questions** **(14)**

(a) Explain the theory of Adsorb water. **07**

(b) State Stoke's law. What is its use in sedimentation analysis? **07**

Q-5 **Attempt all questions** **(14)**

(a) Describe the consolidation mechanisms with neat sketch. **07**

(b) Enlist and explain factors affecting the permeability. **07**

Q-6 **Attempt all questions** **(14)**

(a) Two clay specimen A and B of thickness 3cm and 4 cm have void ratio 0.65 and 0.70 respectively under a uniform load of 25 KN/m^2, the void ratio of the two soils reduced to 0.48 and 0.60 respectively. Calculate the ratio of the coefficients of permeability of the two specimens. The time required by specimen A to reach 50 % consolidation is one third of that required by specimen B. **07**

(b) Derive Laplace equation for 2-dimension flow of water through a soil mass. **07**

Q-7 **Attempt all questions** **(14)**

(a) A vane 10.4 cm long and 8 cm in diameter was lowered into soft clay at the bottom of bore hole. Torque was applied and value of failure was 50 N-m. Subsequently, the vane was rotated rapidly such that the soil becomes remoulded. The value of torque at failure for remoulded soil was 18 N-m. Determine the shear strength of clay in the natural and remoulded state and also find the value of sensitivity. **07**

(b) Explain how the results of consolidation test can be used to predict the settlement of a structure caused by the consolidation of clayey soil below foundation. **07**

Q-8 **Attempt all questions** **(14)**

(a) Following data were recorded while performing the compaction test: **07**

Water content (%)	7.71	11.5	14.6	17.50	19.50	21.25
Bulk density (kN/m^3)	17.55	19.50	21.0	20.55	20.30	19.80

Plot the MDD-OMC curve and obtain the optimum water content and maximum dry density. Also plot zero air voids curve. Take G=2.66

(b) Explain Mohr's Coulomb theory. **07**