Enrollment No: _____ **Exam Seat No:**_____

C.U.SHAH UNIVERSITY
Winter Examination-2015

Subject Name : Geotechnical Engineering - I
Subject Code : 4TE05GTE1 **Branch :**B.Tech (Civil)
Semester : 5 **Date :** 07/12/2015 **Time :** 2:30 **To** 5:30 **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 **Attempt the following questions:** **(14)**

a) A soil sample is having a specific gravity of 2.60 and a void ratio of 0.78. the water content in percentage required to fully saturate the soil at that void ratio would be 1
(A) 10 (B) 30 (C) 50 (D) 70

b) Soil are arranged in face to face orientation. This type of soil structure is 1
(A) Dispersed (B) Cohesive matrix (C) Honey comb (D) Flocculent

c) The liquid limit and plastic limit of a soil sample are 70% and 30% respectively. If percentage of the soil fraction with grain size finer than 0.002 mm is 20 %, then activity ratio of the soil sample is 1
(A) 1 (B) 2.4 (C) 3 (D) 2

d) Which of the following affect the permeability of soil ? 1
(A) Grain size (B) Void ratio (C) Degree of saturation (D) All of the above

e) Adsorbed water is also referred as 1
(A) Structural water (B) Free water (C) Hygroscopic water (D) Held water

f) As per IS classification silt size is 1
(A) 0.0075 to 4.75 mm (B) 0.002 to 0.075 mm (C) < 0.002 mm (D) > 4.75 mm

g) Glacier deposited soils are called 1
(A) Talus (B)Loess (C) Drift (D) None of these

h) The common size of direct shear test box is 1
(A) 50 × 50 × 60 mm (B) 50 × 50 × 40 mm
(C) 60 × 60 × 40 mm (D) 60 × 60 × 50 mm

i) Rollers suitable for compacting cohesionless soils are 1
(A) Smooth wheeled rollers (B) Sheep foot rollers
(C) Pneumatic rollers (D) None of these

j) If uniformity coefficient, Cu = 9 and coefficient of curvature C_c = 1 for a soil, then D_{30} / D_{10} for the soil 1
(A) 1 (B) 2 (C) 3 (D) 4

k) Which of the following is a quick test 1
(A) UU test (B) CU test (C) CD test (D) None of the above

l) For a standard proctor test, the mass of hammer and the drop of hammer are 1

(A) 2.6 kg and 310 mm (B) 2.6 kg and 450 mm (C) 4.9 kg and 310 mm (D) 4.9 kg and 450 mm

m) Quick sand is a 1
(A) Moist sand containing fine particles (B) Fine sand easily flowing
(C) Condition in which a cohesionless soil loses all its shear strength due to upward flow of water
(D) None of the above

n) Consolidation testing, curve fitting method is used to determine 1
(A) Compression index (B) Swelling index
(C) coefficient of consolidation (D) time factor

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

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

a) Explain void ratio and effective stress relation for normally consolidated soil. **7**

b) Explain standard proctor test with neat sketch to determine MDD and OMC in the laboratory. **7**

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

a) Explain soil formation in geological cycle? **7**

b) A moist sample of soil has a mass of 630 g and a volume of 300 cm^3at a water content of 10%. Taking G = 2.7, determine void ratio, degree of saturation and percentage of air voids. Also calculate the water content at which the soil gets fully saturated without any increase in the volume. What will be the unit weight at saturation? **7**

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

a) Define specific gravity, void ratio and establish relation between saturated density, specific gravity, degree of saturation, void ratio and density of water. **7**

b) Discuss the areas of work of the consulting geotechnical engineer? **7**

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

a) Write short note on Coarse grained skeleton structure and cohesive matrix structure. **5**

b) Classify the given soil sample basis on particle size distribution curve. **2**

G =20 % , S = 78 % , F = 02 %

% N	10	20	30	60	90	100
D_{mm}	1.28	2.98	3.07	4.80	4.92	5.25

c) Explain wet mechanical analysis and give the limitation of Stokes' Law. **7**

Q-6		**Attempt all questions**	**(14)**
	a)	The plastic limit of a soil is 25 % and its plasticity index is 8%. When the soil is dried from its state at plastic limit, the volume change is 25% of its volume at plastic. Similarly, the corresponding volume change from the liquid limit to the dry state is 34% of its volume at liquid limit. Determine the shrinkage limit and the shrinkage ratio.	**7**
	b)	Describe direct shear test. What are its limitations?	**7**
Q-7		**Attempt all questions**	**(14)**
	a)	A soil sample has a length of 3.5 m and a cross sectional area of 2 m^2. If water flows through such a soil sample and the fluid energy lost is 1650 N.m for every cubic meter flow of water, estimate darcy's velocity and permeability. The time of flow for 1 m^3 of water is 26 hours. Find also the seepage velocity if the void ratio of the sample is 0.58.	**6**
	b)	Explain field compaction methods.	**4**
	c)	Describe vane shear test with neat sketch	**4**
Q-8		**Attempt all questions**	**(14)**
	a)	State and explain factors affecting permeability.	**7**
	b)	What is capillary water ? Discuss capillary rise in soils.	**7**