

C.U.SHAH UNIVERSITY

Summer Examination-2017

Subject Name : Geotechnical Engineering-I

Subject Code :4TE05GTE1

Branch : B.Tech (Civil)

Semester : 5

Date :28/03/2017

Time :02:30 To 05:30

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) Define the following terms: 5
 - (i) Degree of saturation
 - (ii) Compaction
 - (iii) Optimum moisture content
 - (iv) Residual Soil
 - (v) Compression Index
- b) Give the soil size of classification as per IS: 1498-1970. 1
- c) Workout theoretical Maximum dry density for a soil sample having sp.gravity 2.7 and OMC = 16%. 1
- d) A Sampler with a volume of 50 cm³ is filled with a soil sample. When the soil is poured into a graduated cylinder, it displaces 25 cm³ of water. Find the void ratio of Soil. 1
- e) Find the Porosity of soil for the same data in Q-1(d). 1
- f) 1

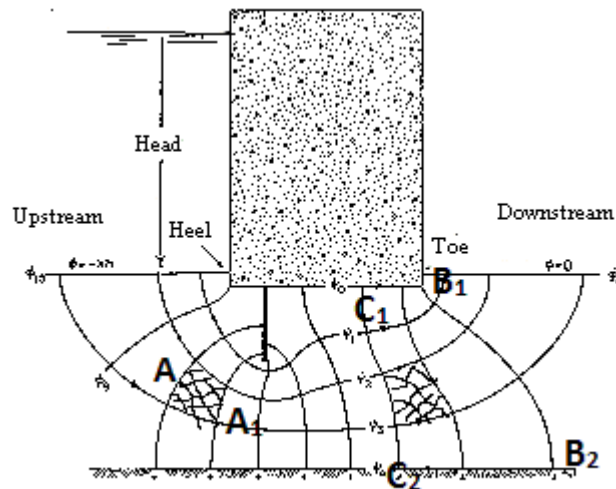


Fig-1

Write the Name of shaded Area bounded between A&A₁. **In fig 1.**

- g) From the Fig-1, Line B₁B₂ & C₁C₂ are known as _____ 1
- h) For the compaction, which type of Roller is ideally suited for cohesive soil? 1



- i) Write the type of soil if soil sample is represented by **SM**. 1
- j) What is Sensitivity of soil? 1

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

- Q-2 Attempt all questions (14)**
- a) The in-situ percentage voids of a sand is 34 percent. For determining the density index, dried sand from the stratum was first filled loosely in a 1000 cm^3 mould and was then vibrated to give a maximum density. The loose dry mass in the mould was 1610 g and the dense dry mass at maximum compaction was found to be 1980g. Determine the density index if the specific gravity of the sand particles is 2.67. 7
- b) Describe the phreatic line of earth with Sketch. 7
- Q-3 Attempt all questions (14)**
- a) Define Particle size distribution curve for different types of soils and also write down the advantages of using semi-log plot for the particle size distribution. 8
- b) Discuss the areas of work of the consulting geotechnical engineer? 6
- Q-4 Attempt all questions (14)**
- a) Explain the Unified Soil classification system in details and also write all prefix & suffix for different soil. 8
- b) What is time factor? how is it related to the average degree of consolidation ? 6
- Q-5 Attempt all questions (14)**
- a) Calculate the co-efficient of permeability of a soil sample, 6 cm in height and 50 cm^2 in cross-sectional area, if a quantity of water equal to 430 ml passed down in 10 minutes, under an effective constant head of 40 cm. on oven-drying, the test specimen has mass of 498 g. Taking the specific gravity of soil solids as 2.65, calculate the seepage velocity of water during the test. 7
- b) Explain sand replacement method to find field density of soil. 7
- Q-6 Attempt all questions (14)**
- a) Enumerate the various tests for finding the shear strength of soil and explain any one test of shear strength with its sketch. 8
- b) A Cohesive Soil yields a maximum dry density of 1.8 g/cc at an OMC of 16 % during a standard proctor test. If the values of G_s is 2.65, what is the degree of saturation? What is the maximum dry density it can further compacted to? 6
- Q-7 Attempt all questions (14)**
- a) What are the factors affecting compaction? Discuss in details. 7
- b) Derive Laplace equation for 2-D flow through soil. 7
- Q-8 Attempt all questions (14)**
- a) Determine effective and neutral stresses at a depth of 15 m below the ground surface for the following condition: water table 3.0 m below ground surface, $G_s = 2.65$, $e = 0.7$, average moisture content = 5%. 7
- b) Write short notes on the following structure with neat sketch: 7
- (i) Honeycomb structure (ii) Soil grained skeleton Structure

