KATIHAR ENGINEERING COLLEGE

Code: 011509

B.Tech 5th semester Mid Term Exam

Soil Mechanics-I

Time: 2 hours **Full Marks: 20**

Instructor: Prof. Rashid Mustafa

Instructions: Answer any five question in which question number 1 is compulsory

The marks are indicated in the right- hand margin

1. Choose and write the correct option **1x4= 04**

(i) A point load of 650 kN is applied on the surface of a thick layer of clay. Using Boussinesq's elastic analysis, what are the value of the estimated vertical stress at a depth 2 m and a radial distance of 1.0 m from the point of application of load?

(a) 55 kN/m^2 (b) 44.4 kN/m^2 (c) 41 kN/m^2 (d) 37 kN/m^2

(ii) The difference between maximum void and minimum void ratio of a sand sample is 0.30. If the relative density of this sample is 66.6% at a void ratio of 0.40, then the void ratio of this sample at its loosest state will be:

(a) 0.40 (b) 0.60 (c) 0.50 (d) 0.75

(iii) As per the Indian standard soil classification system, a sample of silty clay with liquid limit of 40% and plasticity index of 28% is classified as

(a) CH (b) CI (c) CL (d) CL-ML

(iv)The unit weight of a soil at zero air voids depends on

(a) Specific gravity (b) water content (c) unit weight of water (d) All

2. A core cutter 12.6cm in height and 10.2cm in diameter weighs 1071gm when empty. It is used to determine the in-situ unit weight of an embankment. The weight of core-cutter full of soil is 2970 gm. If the water content is 6%, what are the in-situ dry unit weight, porosity, degree of saturation and air content of the soil? Take $G_s = 2.65$ **04**

3. Differentiate between IS light compaction test and heavy compaction test. Explain the factor affecting compaction. **04**

4. 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 value of G is 2.65, what is the degree of saturation? What is the maximum dry density it can be further compacted to? **04**

5. The in-situ void ratio of a granular soil deposit is 0.50. The maximum and minimum void ratio of soil was determined to be 0.75 and 0.35. The specific gravity of the soil solids is 2.67. Determine the following

(a) Relative density

(b) Relative compaction of soil deposit **04**

6. (a) The consistency limits of clayey soil are as follows:

Liquid limit = 55%, Plastic Limit = 25%, Shrinkage Limit = 15%, natural water content=30%

Determine liquidity index and Plasticity Index. **02**

(b) The data presented below are related to three clay minerals- Kaolinite, Illite and Montmorillonite. Place the proper name beside the properties given below:

(i) Largest grain size, Smallest grain size, Intermediate grain size

(ii) Smallest swelling and shrinkage, Largest value, Intermediate value **02**

7. A soil sample is tested in the laboratory for classification. The test results are as follows:

Percentage passing 4.75 mm IS sieve = 58

Percentage passing 75 micron IS sieve = 11

The Particle size, D_{60} = 6.3 mm, D30 = 0.5 mm, D_{10}= 0.07 mm

Liquid limit = 42%, Plastic Limit = 21%

Classify the soil. **04**

----End of the paper----

Note: Solution of Mid Term Exam (Soil Mechanics-I) will be uploaded on the college website **www.keck.ac.in**