PRESIDENCY UNIVERSITY
BENGALURU

SCHOOL OF ENGINEERING

TEST – 1

Winter Semester: 2021 - 22   **Date**: 25ʰ MAY 2022

Course Code: CIV 2015   **Time**: 09:30AM – 10:30AM

Course Name: GEOTECHNICAL ENGINEERING   **Max Marks**: 30

Program & Sem: B.Tech (CIVIL) & IV Sem   **Weightage**: 15%

Instructions:
- *(i)* ***Read the question carefully and answer all the questions***
- *(ii)* ***Only scientific calculators allowed***

Part A [Memory Recall Questions]

Answer all the Questions. Each Question carries THREE marks.   (4Qx3M=12M)

Q.NO.1.The soil deposits of India may be classified in to five major groups. Black cotton and alluvial soils are the major groups found in India. Explain Black cotton soil and alluvial soils.

(C.O.1) [Knowledge]

Q.NO.2.Understanding of basic definitions are very important in soil mechanics. In this context define void ratio, porosity and water content.   (C.O.1) [Knowledge]

Q.NO.3.The properties of soils are indicative of the engineering properties are called index properties. List the index properties of soil.   (C.O.1) [Knowledge]

Q.NO.4.The soil sample is procured from a construction site and its water content is 10% and bulk density is 1.6 g/cc then find its dry density.   (C.O.1) [Knowledge]

Part B [Thought Provoking Questions]

Answer both the Questions. Each Question carries FIVE marks.   (2Qx5M=10M)

Q.NO.5. Soil may be considered as an incidental material obtained from the geologic cycle which goes on continuously in nature. Explain the geological cycle with a neat diagram.

(C.O.1) [Comprehension]

Q.NO.6. Soil has a volume of 100cc and mass of 190 g. On oven drying for 24 hours, the mass is reduced to 160 g. If the specific gravity of grains is 2.68, determine water content, voids ratio and degree of saturation of soil.   (C.O.1) [Comprehension]

Part C [Problem Solving Questions]

Answer the Question. The Question carries EIGHT marks. **(1Qx8M=8M)**

Q.NO.7. A project site at Yelahanka needs its index property to be evaluated. It was found that specific gravity of sand particles is 2.67 and the in-situ percentage voids of a sand deposit is 34%. For determining density index, dried stratum was filled loosely in 1000cc mould and was then vibrated to give a maximum density. The loose dry mass in the mould was 1610 g and dense dry mass at maximum compaction was found to be 1980 g. With this data compute Density Index of the soil. (C.O.1) [Application]

PRESIDENCY UNIVERSITY
BENGALURU

SCHOOL OF ENGINEERING

TEST – 2 EXAMINATION

Odd Semester: 2021-22   **Date**: 1st June 2022

Course Code : CIV 2015   **Time**: 11.30 AM to 12.30 PM

Course Name: GEOTECHNICAL ENGINEERING   **Max Marks**: 30

Program & Sem: B.Tech (CIVIL) & IV   **Weightage**: 15%

Instructions:
   (i)   ***Read the question carefully and answer all the questions***
   (ii)   ***Only scientific calculators allowed***

Part A [Memory Recall Questions]

**Answer   all   the   Questions.   Each   Question   carries   Four   marks.
(3Qx4M=12M)**

1. Geometrical arrangement of soil particles with respect to one another is known as soil
Structure. Explain Flocculated and Dispersed structure of soil with a neat diagram.
(C.O.1)

[Knowledge]

2. Discharge velocity and Seepage velocity are two different parameters when permeability of soil
is studied. List the difference between them.
.   (C.O.2) [Knowledge]

3. At a construction site at Rajanakunte, the coefficient of permeability of the fine grained soil is
to be determined from the following data. Length of the soil sample is 100 mm, head of water is
60 mm, diameter of the soil sample is 100 mm and 350 cubic centimeter of water is collected in
270 seconds. With this data, determine the coefficient of permeability of the soil
(C.O.2)

[Knowledge]

Part B [Thought Provoking Questions]

**Answer both the Questions. Each Question carries Five marks.
(2Qx5M=10M)**

4. The law of flow of water through soil was first studied by Darcy. List the validity of Darcy's law.

(C.O.2)
[Comprehension]

5. Permeability of soil is one of the important engineering properties of soil and there are various factors which affect permeability of soil. List the factors affecting permeability of soil and explain any one of them. (C.O.2) [Comprehension]

Part C [Problem Solving Questions]

Answer the Question. The Question carries Eight marks.
(1Qx8M=8M)

6. Three types of soil were found at a construction site in Rajajinagar. The results of the sieve analysis is given below. Classify the soil according to Indian soil classification system, give the group symbol for the soil and also draw the Plasticity Chart.

i) Soil A - Percentage passing 75 micron sieve=10, Percentage retained on 4.75 mm sieve = 90, Coefficient of Uniformity (Cu) =5 and Coefficient of Curvature (Cc) =2.

ii) Soil B - Percentage passing 75 micron sieve=90, Percentage retained on 4.75 mm sieve = 10, Coefficient of Uniformity (Cu) =7 and Coefficient of Curvature (Cc) =2.
. (C.O.1) [Application]

PRESIDENCY UNIVERSITY
BENGALURU

SCHOOL OF ENGINEERING

END TERM EXAMINATION

Odd Semester: 2021-22   **Date**: 29th June 2022

Course Code : CIV 2015   **Time**: 09.30 AM to 12.30 PM

Course Name: GEOTECHNICAL ENGINEERING   **Max Marks**: 100

Program & Sem: B.Tech (CIVIL) & IV Sem   **Weightage**: 50%

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Instructions:

   (i)   ***Read the question carefully and answer all the questions***
   (ii)   ***Only scientific calculators allowed***

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Part A [Memory Recall Questions]

Answer all the Questions. Each Question carries FIVE marks. (5Qx5M=25M)

Q.NO.1.Consistency limits gives the information about degree of compactness of the soil. List the Consistency limits and explain shrinkage limit of soil.   (C.O.1) [Knowledge]

Q.NO.2. The soil properties at a construction site are specific gravity=2.6, dry unit weight is 20 kN/m^3 Determine voids ratio and porosity of the soil.   (C.O.1) [Knowledge]

Q.NO.3. Coefficient of permeability of soil can be determined by Darcy's law. State Darcy's law and its assumptions.   (C.O.2) [Knowledge]

Q.NO.4.Permeability of soil is very important engineering properties of soil. Determine the coefficient of permeability of coarse fine grained soil from the following experimental data. The water level in the stand pipe dropped from 450 mm to 200 mm in 55 minutes. The diameter of the sample and stand pipe were 8 cm and 5 mm respectively, while the length of the sample was 95 mm.

                                                                                                         (C.O.2)

[Knowledge]

Q.NO.5.Consolidation and compaction are the two important parameters in soil. List the difference between them and also explain primary and secondary consolidation.   (C.O.3) [Knowledge]

Part B [Thought Provoking Questions]

Answer all the Questions. Each Question carries TEN marks.   **(3Qx10M=30M)**

Q.NO.6. The soil which exhibits same properties are grouped together and are classified. A soil from a construction site at Hubli is to be classified. Classify the soil according to IS soil classification system with group symbol from the given data i) Percentage of soil passing 75micron sieve =48%, ii) Percentage of coarse fraction passing 4.75mm sieve=88%, iii)Uniformity coefficient (Cu) = 8 and coefficient of curvature Cc=2.5 . (C.O.1)
[Comprehension]

Q.NO.7. Sudden reduction in volume of soil takes place with sudden application of loads and this process is known as compaction. There are various factors which affect compaction. Explain factors affecting compaction. (C.O.3)
[Comprehension]
Q.NO.8. Compression of soil is due to the escape of water when external load is applied is called Consolidation. Explain Mass spring analogy of soil consolidation with a neat diagram.
(C.O.3)

[Comprehension]

Part C [Problem Solving Questions]

Answer all the Questions. Each Question carries FIFTEEN marks.
(3Qx15M=45M)

Q.NO.9. From a construction site near Nagarbhavi, the soil is procured and the sieve analysis is carried out. Following table show the results of sieve analysis. Determine its coefficient of uniformity and coefficient of curvature of the soil. Also determine the gradation of the soil from the graph.

Percentage Finer	82.78	66.11	49.44	33.88	21.1	11.1	8.32
Particle size	4.75mm	2mm	1mm	0.6mm	425 micron	150 micron	75 micron

(C.O.1)

[Application]
Q.NO.10. The diagram shown below is the profile of the ground at a construction site at Rajanukunte from soil investigation report. Calculate and plot the total stress, pore water pressure and effective stress diagram for the soil profile shown in Fig. (C.O.2)
[Application]
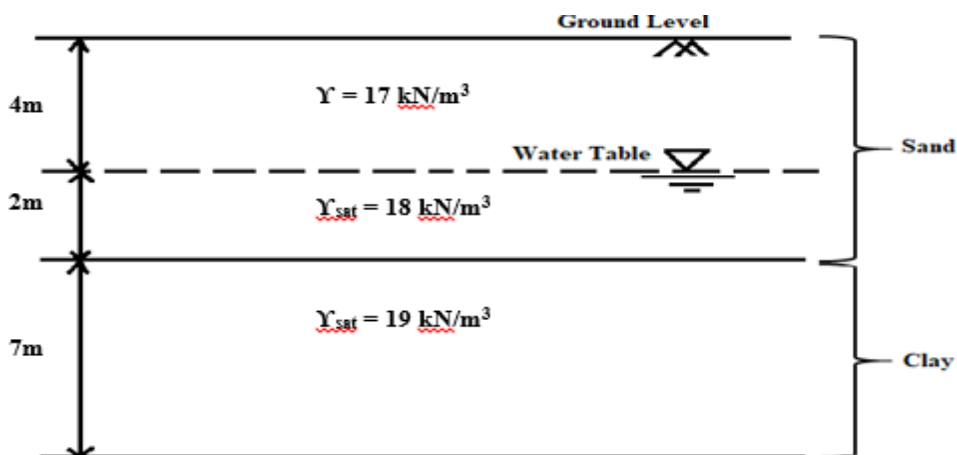
Q.NO.11. For the construction of Bengaluru-Mysore highway road, the subgrade compaction properties need to be evaluated. Soil is brought to the laboratory and standard compaction test was performed. The following table gives the Standard Proctor compaction test results. Draw the compaction curve using the graph sheet and determine maximum dry density and optimum moisture content of the soil. Volume of the mould is 1000 cc, mass of mould is 1000 g and specific gravity is G=2.6   (C.O.3)
[Application]

Mass of mould+wet soil (g)	2665	2996	3189	2990	2550
Water Content (%)	15	18	25	30	34