CBCS SCHEME

USN | | | | | | | | | | | **15CV45**

Fourth Semester B.E. Degree Examination, Dec.2018/Jan.2019
Basic Geotechnical Engineering

Time: 3 hrs.   Max. Marks: 80

Note: Answer any FIVE full questions, choosing one full question from each module.

Module-1

1 a. Define : i) Void ratio   ii) Porosity   iii) Degree of saturation   iv) Air content.   **(08 Marks)**
   b. Explain the procedure to determine density of soil by core cutter method and sand replacement method.   **(08 Marks)**

OR

2 a. Explain Atterberg's limits.   **(06 Marks)**
   b. The liquid and plastic limits of a given soil sample are 65% and 40% respectively. Compute its consistency index, liquidity index, flow index and toughness index. Given that the water content in the soil sample decreases from 80% to 40% for a ten fold increase in the number of blows required to close the groove in the standard liquid limit apparatus.   **(10 Marks)**

Module-2

3 a. Explain with neat sketches, the soil structure.   **(08 Marks)**
   b. Describe the three principal clay minerals.   **(08 Marks)**

OR

4 a. What are the objectives of compaction?   **(04 Marks)**
   b. List the factors affecting compaction.   **(04 Marks)**
   c. Following are the observations of compaction test:

Water content %	Weight of wet soil (N)
7.7	16.67
11.5	18.54
14.6	19.92
17.5	19.52
19.5	19.23
21.2	18.83

If the volume of compaction mould is 950 CC and G = 2.65, determine the dry unit weight and OMC.   **(08 Marks)**

Module-3

5 a. Explain the laboratory method of determination of permeability by constant head method and variable head method.   **(08 Marks)**
   b. The following details refer to a test to determine the permeability of soil.
   Thickness of specimen = 25mm
   Diameter of stand pipe = 10mm
   Initial head = 1000mm
   Final head = 800mm
   Determine the permeability of soil. If the void ratio of sample is 0.75, what is the permeability of same soil at a void ratio of 0.9?   **(08 Marks)**

OR

6 a. What are the important properties of flow nets? **(04 Marks)**

b. The porosity of a certain sample of sand was 50% in the loose state and 34% in the dense state. The specific gravity is 2.70. Estimate the critical hydraulic gradients in loose and dense states. **(04 Marks)**

c. A clay strata of thickness 8m is located at a depth of 6m below ground surface. It is overlaid by fine sand. The water table is located at a depth of 2m below the ground surface. For fine sand the submerged unit weight is 10.2 kN/m^3. The moist unit weight of sand located above the water table is $16kN/m^3$. For clay layer, $G = 2.76$ and water content = 25%. Compute the effective stress at the middle of clay layer. **(08 Marks)**

Module-4

7 a. Explain Mass-Spring analogy. **(08 Marks)**

b. What are the assumptions made in Terzaghis theory of one-dimensional consolidation? **(08 Marks)**

OR

8 a. Explain compressibility of soil and volume change. **(04 Marks)**

b. Differentiate between normally consolidated soil and over-consolidated soil. **(04 Marks)**

c. A saturated specimen of clay had undergone consolidation under a pressure of $200kN/m^2$ in an oedometer test. The thickness of the specimen was found to be 21.18mm and its water content 12%. Subsequently, with a further increase in pressure of $100kN/m^2$, the thickness of specimen at the end of 24 hrs was reduced by 1.18mm. Compute the coefficient of volume compressibility and compression index of soil $G = 2.7$. **(08 Marks)**

Module-5

9 a. Explain Mohr's Coulombs failure theory and draw the failure envelope for different soils. **(08 Marks)**

b. What are the factors affecting the shear strength of soil? **(04 Marks)**

c. What are the advantages and disadvantages of direct shear test? **(04 Marks)**

OR

10 a. Explain triaxial compression test and what are the advantages of triaxial test. **(08 Marks)**

b. Following results are obtained from a direct shear test on a soil at failure,

Normal load (N)	100	200	300	400
Shear load (N)	90	181	270	362

Size of the box = 6cm × 6cm. Determine shear strength parameters. **(08 Marks)**

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