Total number of printed pages: **02** **Programme(D)/Semester/DCE503**

2024

GEOTECHNICAL ENGINEERING

Full Marks : 100

Time : Three hours

The figures in the margin indicate full marks for the questions.

*Answer **any five** questions.*

1. a) Define compaction. What are the objectives of compaction? Describe the factors affecting compaction of soil. **(2+3+5)**

   b) With a neat schematic graph, explain the different states of soils at different water content. **(10)**

2. a) Define consolidation. What is over consolidation ratio (OCR)? What are the difference between consolidation and compaction? **(5+5)**

   b) What is permeability? Discuss the various factors that affect permeability of soil. **(3+7)**

3. a) Following are the results of a compaction test? **(10)**

Mass of soil + wet soil (gm)	2695	3095	3159	3125	3070
Water content (%)	10	12	14.3	16.1	18.2

   The volume of the mold = 1000 cm^3, mass of mold = 1000 gm and G = 2.7.

   Plot the compaction curve showing the OMC and MDD.

   b) Explain the significance of Standard Proctor test. **(5)**

   c) What are Atterberg limits? Explain them. **(5)**

4. a) Distinguish between void ratio and porosity. Derive the relation between void ratio and porosity **(5+5)**

   b) An undisturbed sample obtained from field weighted 16 N, with a volume of $1x10^{-3}$ m^3. The dry unit weight of the sample was 14.6 kN/m^3 and its specific **(10)**

gravity was 2.6. Determine (i) water content (ii) void ratio (iii) Degree of saturation. (Assume unit weight of water 10 kN/m^3)

5. a) A sample of saturated soil has water content of 36%. The specific gravity of solids is 2.63. Determine its (i) void ratio (ii) saturated unit weight (iii) dry unit weight. **(10)**

   b) The dry unit weight of a sand in the loosest and densest states are respectively 13.56 kN/m^3 and 18.44 kN/m^3. Assuming the specific gravity of the solids as 2.6, determine the relative density of sand with porosity of 30%. **(10)**

6. a) Differentiate between: **(5x4)**

   i) Seepage velocity and Discharge velocity

   ii) Void ratio and Porosity

   iii) Compaction and Consolidation

   iv) Well graded and Poorly graded soil

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