CT-503/GTE/5th Sem (O)/2018/M

GEOTECHNICAL ENGINEERING

Full Marks – 70

Time – Three hours

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

PART – A

Answer *all* the questions.

1. Choose the correct answer from the options given below the statement :   1×10=10

    (i) Which of the following constituents is predominant in silty clay soil ?

    (a) Clay   (b) Silt

    (c) Sand   (d) All of the above

    (ii) ———— particles can not be seen with naked eyes.

    (a) Gravel   (b) Sand

    (c) Clay   (d) Silt

[Turn over

(iii) In compaction ——— occurs.

(a) Expulsion of water

(b) Expulsion of air

(c) None of the above

(d) All of the mentioned above

(iv) Which of the following equipment is not used in standard compactor test ?

(a) Cylindrical metal mould

(b) Rammer

(c) Circular face plate

(d) Collar

(v) The water content corresponding to the maximum density in compaction curve is called ———.

(a) Water content of compacted soil

(b) Optimum water content

(c) Air void water content

(d) None of the mentioned above

(vi) Permeability can be determined by direct measurement with the help of ———.

(a) Permeameter

(b) Consolidation test

(c) Horizontal capillary test

(d) Pumping-out test

(vii) The unit of coefficient of permeability (K) is ———.

(a) Kg/cm

(b) m/s

(c) m²

(d) All of the mentioned above

(viii) What is the diameter of the sieve that is used for finding the liquid limit ?

(a) 275 microns

(b) 700 microns

(c) 425 microns

(d) 200 microns

(ix) Consolidation is occured faster in ———.

(a) Clay

(b) Gravel

(c) Sand

(d) Silt

(x) The shearing resistance of a soil is constituted by ———.

(a) Structural resistance and Frictional resistance

(b) Shearing strength

(c) None of the mentioned above

(d) All of the mentioned above

2. (a) For a dry soil mass how many phase will be present in a phase diagram ? 1

(b) What is the difference between clayey silt and silty clay soil ? 2

(c) Name the shear strength parameters for soil. 2

(d) What is seepage ? 2

(e) Differentiate dry unit weight and wet unit weight of soil. 3

(f) What is the basic difference between compaction and consolidation ? 2

(g) Why internal friction angle of a soil specimen tested in unconfined compression test is zero ? 2

(h) Between sand and clay which is more permeable ? 1

PART – B

Answer *all* the questions.

3. A partially saturated soil sample from a borrow pit has a natural moisture content of 15% and bulk unit weight of 1.9 g/cc. The specific gravity of soil solids is 2.70. Determine the degree of saturation and void ratio. What will be the unit weight of the sample on saturation ?

$$5+5+5=15$$

4. A soil having $G = 2.75$ is subjected to proctor compaction test in a mould of volume of 945 cm^3. The observations recorded are as follows :

Mass of wet sample (g)	Water content (w%)
1389	7.5
1767	12.1
1824	17.5
1784	21.0
1701	25.1

Determine the maximum dry density and optimum moisture content of the soil. 15

5. Distinguish between permeability and seepage. Give the expression for seepage velocity. What is quick sand condition ? 5

6. Determine the shear strength in terms of effective stress on a plane within a saturated soil mass at a point where the total normal stress is 200 KN/m² and the pore water pressure is 80 KN/m². The effective shear strength parameters for the soil are: $c' = 16$ KN/m² and $\phi' = 30°$. 10

Or

How will you obtain MDD and OMC from compaction curve, explain. What are the influencing factors for compaction ? 10