Total No. of printed pages = 4

CT-503/Geotech.Engg./5th Sem/2016/N

GEOTECHNICAL ENGINEERING

Full Marks – 70

Pass Marks – 28

Time – Three hours

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

Answer question No. 1 and any *four* from the rest.

1. (a) Plot the phase diagram for partially saturated, saturated and dry soil. 3

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

(c) Differentiate between dry unit weight of soil and wet unit weight of soil. 2

(d) Name the forces which are predominant in cohesionless and finegrained soil. 2

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

2. (a) The water content of a saturated soil and the specific gravity of soil solids are found to be 30% and 2.67 respectively. Assuming the unit weight of water to be 10 kN/m^3, find the saturated unit weight and void ratio of the soil. 5

(b) Soil has been compacted in an embankment to 2.15 t/m^3 and the water content of 12%. The value of specific gravity of soil solids is 2.65. Estimate dry density, void ratio, degree of saturation and air content. 10

3. (a) How will you determine whether the given soil is of organic origin or coarse grained or fine grained ? Classify soil according to ISSCS. 5

(b) What is the difference between compaction and consolidation ? Distinguish between normally consolidated, over-consolidated and under-consolidated soil. 4+6=10

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

Mass of wet sample (g)	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. 15

5. (a) What are the various factors affecting the permeability and compaction of a soil mass ? Discuss separately. 10

(b) A cylindrical soil sample fails under an axial vertical stress of 160 kN/m^2, when it is laterally unconfined. The failure plane makes an angle of 50^o with the horizontal. Calculate the value of cohesion and the angle of internal fraction of the soil. 5

6. (a) What is consistency of soils ? Write about the different consistency limits of a fine grained soil. 5

(b) Water is flowing at the rate of 0.05 ml/sec in an upward direction through a fine sand sample whose co-efficient of permeability is 2×10^{-3} cm/sec. The sample thickness is 12 cm and cross-sectional area is 50 cm^2. Find the effective pressure at the middle and bottom sections of sample, if the saturated unit weight of sand is 19.4 kN/M^3. 10