T.E sem I CBGS old Civil G.E.1 8/6/16

QP Code : 29352

(3 Hours) **[Total Marks : 100**

N. B.: (1) Question No. 1 is compulsory.
(2) Attempt any four from remaining six questions.
(3) Figures to the right indicate the full marks.
(4) Assume any suitable data if not given and justify the same.

Q.1 (A) Define following with their definition and use. [05]
(I) Plasticity index (II) Shrinkage index (III) Toughness index (IV) Flow index
(B) Explain quick sand condition. [05]
(C) Differentiate between compaction and consolidation. [05]
(D) Explain field identification of soil. [05]

Q.2 (A) From first principles establish the relationship between following parameters. [10]
(I) e, S_r, w and G (II) w, G, γ_d, n_a and γ_w.
(B) Explain pumping in and pumping out test for determining the in situ permeability of soil deposit. [10]

Q.3 (A) A sample of clay taken from a natural stratum was found to be partially saturated and when tested in the laboratory gave the following results. Compute the degree of saturation. Specific gravity of soil particles is 2.6, wet weight of sample 250 N, dry weight of sample is 210 N and volume of sample is 150 cm^3. [10]
(B) Explain effect of drainage conditions on shear strength of soil. [05]
(C) Explain merit and demerit of tri axial test. [05]

Q.4 (A) An oven dry soil sample of volume 225 cm^3 weighs 3.90 N. if the grain specific gravity is 2.72, determine the void ratio and shrinkage limit. What will be the water content which will fully saturate the sample and also cause an increase in volume equal to 8% of the original volume? [10]
(B) Discuss various indirect techniques of sub surface investigation. [10]

Q.5 (A) Draw the total, effective and neutral stress diagrams up to a depth of 6 m below ground level, given the following data. The water table is 2 m below ground level. The dry unit weight of soil is 17.66 kN/m^3, water content is 12%, and specific gravity is 2.65. What would be the change in these stresses, if water table drops by 1 meter? [10]
(B) Explain factors affecting the compaction. Also explain the determination of MDD and OMC by heavy compaction test. [10]

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Q.6 (A) A moist soil sample compacted into a mould of 1000 cm^3 capacity and weight 35 N, weighs 53.5 N with the mould. A representative sample of soil taken from it has an initial weight of 0.187 N and even dry weight of 0.169 N. Determine (a) water content, (b) wet unit weight, (c) Dry unit weight, (d) void ratio and (e) degree of saturation. [10]

(B) Explain textural soil classification system. [05]

(C) In shear strength test if $\alpha = 60^0$, $\sigma = 20$ kN/m^2 and $c = 10$ kN/m^2. Determine the Φ and shear strength. [05]

Q.7 (A) A cylindrical specimen of a saturated soil fails under an axial stress 150 kN/m^2 in an unconfined compression test. The failure plane makes an angle of 52^0 with horizontal. Calculate the cohesion and angle of internal friction of the soil. [10]

(B) A saturated soil has a compression index of 0.25. Its void ratio at a stress of 10 kN/m^2 is 2.02 and its permeability is 3.4×10^{-7} mm/sec. Compute:

(I) Change in void ratio if the stress is increased to 19 kN/m^2

(II) Settlement in (I) if the soil stratum is 5 m thick; and

(III) Time required for 40% consolidation if drainage is one way. [10]

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