TCE-506 **1224** Printed Pages : 4

Paper Code & Roll No. to be filled in your Answer Book

Roll No. | | | | | | | | | | |

B. Tech. III Year (V Sem.)

Civil Engineering

Odd Semester Examination-2015

SOIL MECHANICS & ENGG GEOLOGY

Time : 3 Hours] *[Maximum Marks :100*

Answer any Four (4x5=20)

1.1 Briefly explain some special type of soils like Muck, Peat, Talus, Loam and Bentonite.

1.2 The mass specific gravity of a soil is 1.95, while the specific gravity of soil solids is 2.7. If the moisture content of the soil be 22%. Determine the following: void ratio, porosity, degree of saturation, dry density and saturated density.

1.3 What do you mean by the Unified Soil Classification System (USCS)? Give the value of different grain sizes for the soil classification according to this system. Also give some guidance for this classification system.

1.4 Derive the functional relationship between γ_d, γ_w, w, G, s and e.

1.5 Explain the principle behind the hydrometer analysis. 500 g of dry soil was used for a sieve analysis. The masses of soil retained on each sieve are given below:

Sieve Size	2 mm	1.4 mm	1.0 mm	500 μ	250 μ	125 μ	75 μ
Mass in Gram (g)	10	18	60	135	145	56	45

Plot a grain size distribution curve and compute the following: Percentages of gravel, coarse sand, medium sand, fine sand and silt as per IS soil classification system.

Answer any Four (4×5=20)

2.1 What do you mean by the compaction efforts? Sketch a dry density versus water content curve for different efforts and show the line of optimum in this curve.

2.2 Relate the various methods of determination of coefficient of permeability with the soil types for which they are best suited. How will you find out the permeability in the laboratory through the constant head permeability test?

2.3 Give the expressions of the equivalent permeability for horizontal and vertical flow of water in soil medium.

2.4 Give the reason behind the piping failure in the granular soils? What do you mean by the critical hydraulic gradient?

2.5 What do you mean by unconfined flow? For the unconfined flow how will you draw a phreatic line?

Answer any Two (2×10=20)

3.1 As a geotechnical engineer why pre-compression technique is the best technique to minimize the post construction settlements? What is the principle of pre-compression? Also show the settlement versus time curve for the pre-compression case.

3.2 Explain i) Darcy's Law
ii) Laplace's Equation
iii) Piping

3.3 Following are the results of a laboratory consolidation test on a soil specimen obtained from the field. Dry mass of specimen = 128 g, height of the specimen at the beginning of the test = 2.54 cm, $G_s = 2.75$ and area of the specimen = 30.68 cm^2. Make necessary calculations and draw an e versus $\log \sigma'$ curve.

Pressure, σ' (kN/m^2)	Final height of specimen at the end of consolidation (cm)
0	2.540
50	2.488
100	2.465
200	2.431
400	2.389
800	2.324
1600	2.225
3200	2.115

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Answer any Two (2×10=20)

4.1 Give the principles of direct shear test and consolidated - undrained test. Show the plot of shear stress and change in height of specimen versus shear displacement for loose and dense dry sand.

4.2 Show the curves between: Volume change versus time, Deviator stress versus axial strain and Variation of pore water pressure versus axial strain for consolidated - drained test.

4.3 Discuss in brief the Skempton's coefficients.

Answer any Two (2×10=20)

5.1 Explain Dip, strike, faults, folds and joints with respect to structural geology.

5.2 Explain the various causes of landslides.

5.3 Discuss the engineering properties of rocks?

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