Hall Ticket No | | | | | | | | | | | Question Paper Code: ACE006

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

B.Tech IV Semester End Examinations (Regular) - May, 2018

Regulation: IARE – R16

GEOTECHNICAL ENGINEERING

Time: 3 Hours **(CE)** **Max Marks: 70**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

UNIT – I

1. (a) What are the corrections to be applied in hydrometer analysis? Explain the principle of hydrometer analysis. **[7M]**

   (b) A soil specimen has water content of 10% and a wet unit weight of 20kN/m^3. If the specific gravity of solids is 2.70, determine the dry unit weight, void ratio and degree of saturation. Take γ_w =19kN/m^3. **[7M]**

2. (a) What are the different types of soil structures? Explain them with neat sketch. **[7M]**

   (b) A soil has a liquid limit of 25% and flow index of 12.5%, if the plastic limit is 15%, determine the plasticity index and toughness index.

   If the water content of the soil in its natural condition in the field is 20%. Find the liquidity index. **[7M]**

UNIT – II

3. (a) Define permeability. Explain the factors affecting permeability of soil. **[7M]**

   (b) Compute the coefficient of permeability of a soil on which a falling head test has been carried out. Area of sample =80 cm^2, area of stand pipe = 4cm^2 and length of soil sample = 15cm. Time Vs Head difference readings are as given in Table 1. **[7M]**

Table 1

Time (minute)	0	27	60
Head difference, h (cm)	107	105	103

4. (a) Explain about total stress, neutral stress and effective stress conditions. Determine the factor of safety with respect to cohesion for a submerged embankment 25m high and having a slope of 40^0 is subjected to sudden drawdown. (c=40kN/m^2, $\Phi = 10°$, γ_{sat} =18kN/m^3). **[7M]**

   (b) A saturated sand layer over a clay stratum is 5m in depth. The water table is 1.5m below ground level. If the bulk density of saturated sand is 17.66kN/m^3, calculate the effective and neutral pressure on top of the clay layer. **[7M]**

UNIT – III

5. (a) Explain the laboratory test procedure of Modified Proctor Test of compaction. **[7M]**

   (b) A concentrated load of 2000kN is applied at the ground surface. Determine the vertical stress at a point P which is 6m directly below the load. Also calculate the vertical stress at a point R which is at a depth of 6m but at a horizontal distance of 5m from the axis of the load. **[7M]**

6. (a) Define compaction. Explain the various factors affecting the compaction. **[7M]**

   (b) Summarize the assumptions and limitations of Boussinesq's solution. **[7M]**

UNIT – IV

7. (a) Explain the square root of time method and logarithm of time method for the determination of coefficient of consolidation. **[7M]**

   (b) A clay stratum 5m thick has the initial void ratio of 1.50 and the effective overburden pressure of 120kN/m^2. When the sample is subjected to an increase of pressure of 120kN/m^2, the void ratio reduces to 1.44. Determine the coefficient of the volume compressibility and the final settlement of the stratum. **[7M]**

8. (a) Explain about Initial consolidation, Primary and Secondary consolidation. **[7M]**

   (b) Define coefficient of compressibility, compression index and expansion index. Derive an expression for void ratio using height of solids method. **[7M]**

UNIT – V

9. (a) Write the test procedure of Triaxial Test and explain the merits and demerits of Triaxial Test. **[7M]**

   (b) A sample of dry cohesionless soil was tested in a triaxial machine. If the angle of shearing resistance was 36^0 and confining pressure 100kN/m^2, determine the deviator stress at which the sample failed. **[7M]**

10. (a) Explain the Mohr-Coulomb theory. And also draw the failure envelopes. **[7M]**

    (b) An undrained triaxial compression test was conducted on a sample of compacted clay. Pore-water pressure was measured after the application of the cell pressure and also at failure, as given below. Find the pore pressure coefficients A and B. **[7M]**

    i. Consolidation stage:

    Change in cell pressure = 0 to 100kN/m^2

    Change in pore water pressure = -60 to +10kN/m^2

    ii. Shearing stage:

    Deviator stress at failure = 500kN/m^2

    Pore pressure at failure = -70kN/m^2

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