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Total No. of Questions : 09

B.Tech. (CE) (Sem.–6th)

GEOTECHNICAL ENGINEERING

Subject Code : CE-304

Paper ID : [A0619]

Time : 3 Hrs.   Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students has to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students has to attempt any TWO questions.

SECTION-A

1. Answer briefly :

   (a) Difference between flocculated and dispersed structure

   (b) Assumptions in hydrometer analysis

   (c) Define zero air void line

   (d) Difference between primary consolidation and secondary consolidation

   (e) Define critical hydraulic gradient

   (f) Types of tri-axial shear test

   (g) Compare active earth pressure and passive earth pressure

   (h) List various field compaction methods

   (i) Define diffuse double layer

   (j) Define alluvial deposits and Aeolian deposits

SECTION -

2. The volume and weight of a partially [...] and 362gm respectively. After drying i[...] If natural void ratio of soil was 0.54[...] density, bulk density, degree of saturatio[...]

3. A soil has a liquid limit of 50% and pla[...] at its L.L. was dried, the % decrease[...] volume. When it was dried from its P.[...] 20% of its dry volume. Determine the[...] shrinkage ratio.

4. In a falling head permeability test on a s[...] in the stand pipe takes 5 sec to fall fro[...] water level. When another soil of length[...] the time taken for the head to fall betw[...] The permeameter has a x-sectional are[...] area of 130mm². Calculate the permeabi[...]

5. At a site the subsoil consists of a[...] (G = 2.65, e = 0.85, D_{10} = 0.14mm) w[...] clay layer (G = 2.75, w = 22%) below [...] bed rock. The water table is located[...] surface level. Plot the distribution of tota[...]

6. What is effect of compaction on :

   (i) soil structure

   (ii) permeability

   (iii) shear strength

   (iv) compressibility and swelling of so[...]

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SECTION - C

7. An oedometer test was conducted on a specimen of saturated clay (G = 2.70) and the following dial gauge readings were obtained 24 hours after the application of each stress increment:

Stress(kN/m²)	0	50	100	200	400	800	1600	3200	0
Dial Reading(mm)	10	9.75	9.5	9.10	8.45	7.6	6.67	5.73	6.40

The initial thickness of sample was 20mm and water content at the end of test was 20%.

(a) Plot e-log σ curve.

(b) The clay stratum in the field from where the soil sample was taken for laboratory testing, is 5m thick and is likely to be subjected to a stress increment of 1000-1500kN/m². What will be the settlement of clay stratum as computed from m_v and C_c ?

8. The results of CU test on undisturbed samples of saturated clay were as below :

Cell Pressure (kN/m²)	150	300	450	600
Deviator Stress (kN/m²)	102	200	304	405
Pore Pressure at failure (kN/m²)	80	164	264	325

Determine the shear strength parameters in terms of effective stress.

9. For a retaining wall, the following data was available: Height of wall = 7m, Density of backfill = 16kN/m³, $\Phi = 35°$, $\delta = 20°$, back of wall is inclined at 20° to vertical (+ve batter), backfill surface is sloping at 1:10. Determine the magnitude of active earth pressure by Rebann's graphical method.

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