Geotechnical Engineering - I
(1030)

P. Pages : 3

Time : Three Hours

Max. Marks : 100

Instructions to Candidates :
1. Do not write anything on question paper except Seat No.
2. Answersheet should be written with blue ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Solve **any two** questions from each unit.
5. Figure to the right indicates full marks.
6. Assume suitable data if required.
7. Use of non-programmable calculator is allowed.
8. Taylor's chart can be used.

UNIT - I

1. a) Explain three phase system. **10**

2. A sample of sand above water table was found to have a natural moisture content of 15% and a unit weight of 18.84 kN/m^3 laboratory test on a dried soil sample indicates values $e_{min} = 0.5$ and $e_{max} = 0.85$ for the densest and doosest states respectively . Compute the degree of saturation and density index. Assume G = 2.65. **10**

3. In a classification test following results were obtained. **10**

Grain size mm	9.55	3.55	1.21	0.25	0.075
Mass retained gm	170	130	150	20	30

find C_C and C_u make a comment on type of soil.

UNIT - II

4. Prepare a new marks chart for a depth of 5m and explain it. **10**

5. A test results are given for standard product test find OMC and MDD and plot saturation line for 80% **10**

Water content %	7.7	14.6	19.7	17.5	11.5	21.2
Soil mass kg	1.739	2.081	1.986	2.033	1.919	1.948

Volume of mould = 950 ml,
G = 2.65

6. A load of 3000 kN is imposed on a foundation 4m x 4m at shallow depth of in soil mass. Determine vertical stress at a point 10 m below the centre of footing.

    a) Assuming the load is uniformly distributed over the foundation.

    b) Assuming the load acts as a point load at the centre of foundation   **10**

UNIT - III

7. Derive $S = \dfrac{C_c \cdot H}{1 + e_o} \log_{10} \dfrac{\Delta P + P_o}{P_o}$ **10**

8. The loading period for a building extended from Aug. 2007 to Aug. 2009. In Aug. 2012. The any measured settlement was found to be 115 mm, If is known that the ultimate settlement will be about 380 mm. Estimate the settlement in Aug 2017. Assume double drainage occure.   **10**

9.   a) Explain method of for determination of preconsolidation pressure. Using void ratio vs pressure graph i.e. (e vs log p)   **6**

    b) Explain Darcy's law and derive it's equation.   **4**

UNIT - IV

10. Explain unconfined compression test.   **10**

11. Explain the factors affecting shear strength for cohesive soil.   **10**

12.   a) At a depth of 6.8 m from the ground level at a site a shear vane test gave a torque value of 8 kN.cm. The vane is 12 cm high and 8 cm across the blades. Compute the shear strength of soil.   **4**

    b) Explain in short related to   **6**

      i) Undrained test

      ii) Consolidated undrained test.

      iii) Drained test.

UNIT - V

13. Compute the safe height for an embankment rising at an angle of 60° to the horizontal and to be made with a soil having unit weight $20 \, kN/m^3$, $\phi = 15°$ and cohesion $= 20 \, kN/m^2$ factor of safety = 2.5 (Utilized Taylor's stability chart)   **10**

14. Enlist and explain the remedial measures to reduces the landslides.   **10**

15. For an earth retaining structure shown in fig. construct earth pressure diagrame for active state and find the total thrust per unit length of the wall.   **10**

****