Geotechnical Engineering - I (New)
(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. Tayler's stability charts used is allowed.

UNIT - I

1. a) Explain Textural classification of soil.   5

   b) Explain Plasticity chart.   5

2. A sample of sand above water table was found to have a natural moisture content of 15% and a unit weight of 18.84KN/m^3. Laboratory test on a dried soil sample indicates values e_{min} = 0.50 and e_{max} = 0.85 for the densest and loosest states respectively. Compute the degree of saturation and the density index. Assume, G = 2.65   10

3. a) Explain three phase system.   5

   b) Explain core cutter method.   5

UNIT - II

4. A single concentrated load of 1000kN acts at the ground surface. Construct an isobar for σ_2 = 40 KN/m^2. By making used of Boussinesq's equation.   10

5. Explain Newmarks chart with fig. in detailed for depth of 5m.   10

6. Explain modified proctor test.   10

UNIT - III

7.   Derive the expression and explain meaning of each term.   **10**

$$S = \frac{Cc}{1+e_0} \log_{10} \frac{\sigma'_o + \Delta\sigma'}{\sigma'_o} H$$

8.   The loading period for a building extended from July 1987 to July 1989. In July 1992, the average measured settlement was found to be 113mm. It is known that the ultimate settlement will be about 360mm. Estimate the settlement in July 1997. Assume double drainage to occure.   **10**

9.   A flow net for flow around a single row of sheet piles in a permeable soil is shown in fig. Given : $K_x = K_y = K_z = 5 \times 10^{-2}$ mm/sec   **10**

Determine :
i)   How high will the water rise, if measured by piezometers placed at point A, B, C and D ?
ii) What will be the rate of seepage through the flow channel. II per unit length of the sheet pile ?
iii) What is the total rate of seepage through the permeable layer per unit length ?
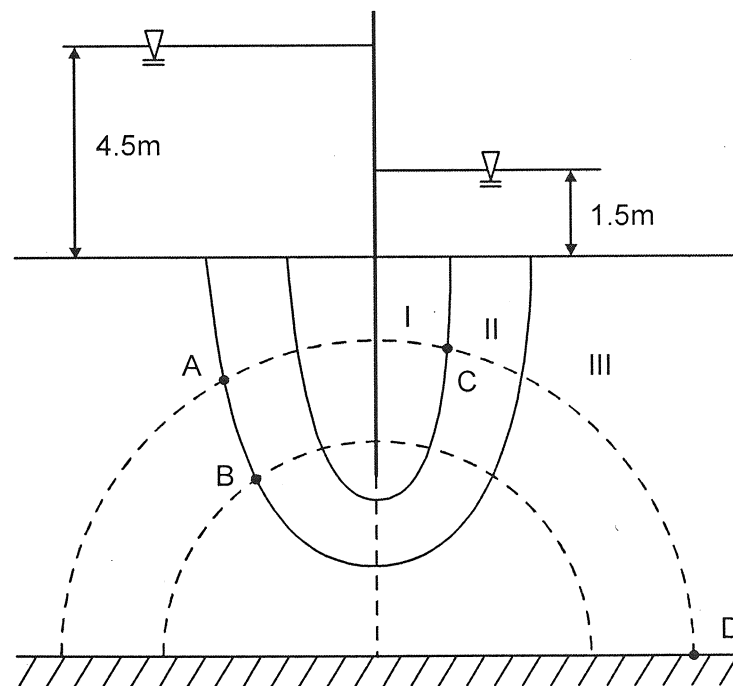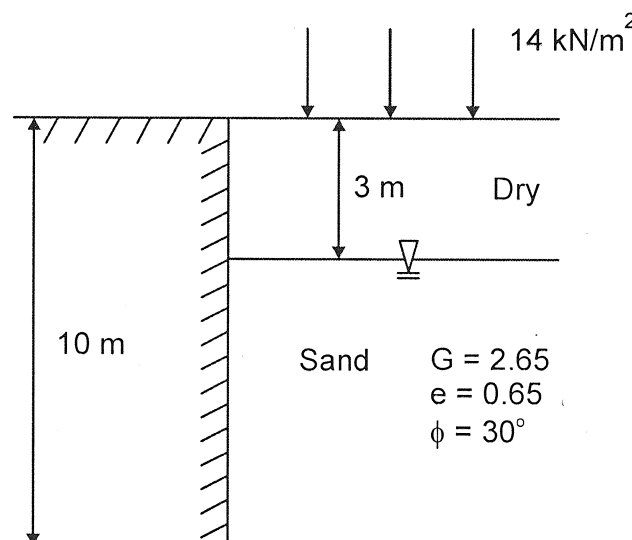
UNIT - IV

10.   Explain factor affecting shear strength.   **10**

11.   What is the shearing strength of soil along a horizontal plane at a depth of 4m in a deposit of sand having the following properties,

$\phi = 35^0$, $r_d = 17KN/m^3$, $G = 2.7$.

Assume the ground water table is at a depth of 2.5 m from the ground surface. Also find the change in the shear strength when the water table rise to the ground surface.   **10**

12.   Explain Direct shear test in detailed.   **10**

UNIT - V

13.   A 30m high earthen dam is to be built from a soil having an effective angle of internal friction of 32° and a cohesive strength of 18 kN/m³. The comparted moist unit weight of the soil is 18.2 kN/m³. and saturated unit weight of 19.1 kN/m³. Calculate the steepest angle at which the upstream slope of the dam may be inclined to the horizontal Assume factor of safety, F.S. = 1.25.   **10**

14.   Explain remedial measures of land slides.   **10**

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

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