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. Answer sheet 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. Assume suitable data, if necessary.
5. Figures to the right indicate full marks.
6. Draw neat sketches wherever necessary.
7. Attempt **all five** questions.

UNIT - I

1. Attempt **any two.**

a) With help of three phase diagram and by using usual notations, prove that $S_r = \dfrac{W \times G}{e}$.   **10**

b) define the terms.   **10**
   i) Liquid Limit.
   ii) Plastic Limit.
   iii) Shrinkage Limit.
   iv) Consistency Index.
   v) Liquidity Index.

c) A soil sample has a porosity 40%. The sp, gravity of solid is 2.7. Calculate   **10**

   i) void ratio.

   ii) Dry density

   iii) Unit weight, if the soil is 50% saturated

   iv) Unit weight if the soil is completely saturated.

UNIT - II

2. a) Define compaction of soil, with the help of a neat sketch explain modified proctor test in details.　**10**

　b) i) Explain Wester Gard theory.　**5**

　　ii) Explain New marks influence chart.　**5**

　c) What is soil stabilization ? List out methods of soil stabilisation, and explain any one method in detail.　**10**

UNIT - III

3. a) What are the different method to determine the permeability of a soil sample ? Discuss briefly their merits and demerits and special applications ?　**10**

　b) Explain the method of determination of coefficient of consolidation (C_v) by square root of time fitting method.　**10**

　c) Calculate the coefficient of permeability of a soil sample 6cm in high and 50 cm sq OR, ($50 cm^2$) in cross sectional area, if a quantity of water equal to 430 CC. passed down in 10 minutes under an effective constant head of 40 cm. On oven drying the test specimen weighed 4.98 N, taking G = 2.65 Calculate the seepage velocity of water during test.　**10**

UNIT - IV

4. a) Discuss the procedure for determination of shear strength of soil by using vane shear test in the laboratory. Also derive the expression for shear strength.　**10**

　b) Explain triaxial test in details with advantages and disadvantages.　**10**

　c) A cylindrical sample of soil having cohesion of 80 kN/m^2 and angle of internal friction of 20° is subjected to a cell pressure of 100 kN/m^2. Determine.　**10**

　　i) The max deviator stress of which the sample will fail.

　　ii) The angle made by the failure plan with the axis of the sample.

UNIT - V

5. a) What are Land Slides ? Discuss the causes of Land Slides and its remedial measure. **10**

b) How will you determine Rankine's Active Earth pressure and passive earth pressure in cohesive and cohesion less soils. **10**

c) A smooth backed vertical wall 6.3 meter high and retains a soil with a bulk unit weight of 18 kN/m^3 and $\phi=18^0$. The top of the soil is level with the top of wall and is horizontal. If the soil surface carries a uniformly distributed load of 4.5 kN/m^2. Determine the total active thrust on the wall per lineal meter of the wall and its point of application. **10**

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