

**VIT**Vellore Institute of Technology  
(Deemed to be University under section 3 of UGC Act, 1956)**Continuous Assessment Test – II**

Programme Name &amp; Branch: B.Tech. (Civil Engg)

Course Name &amp; Code: CLE 1004

Soil Mechanics and Foundation Engg

Class Number: VL2018195003548

Slot: D1 + TD1

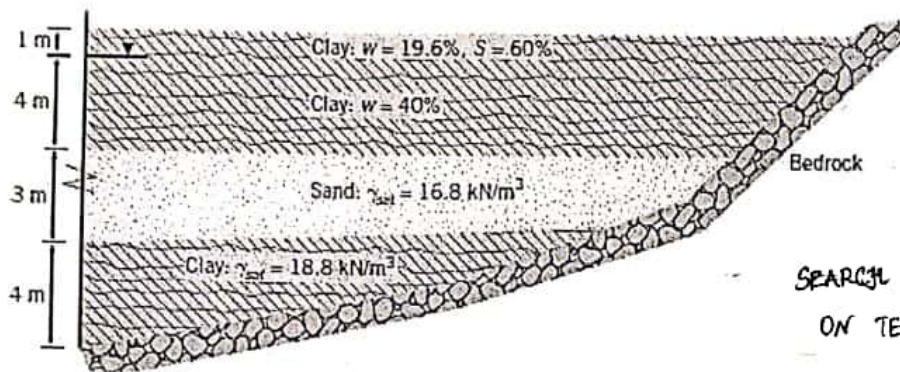
Duration: 90 min

Maximum Marks: 50

*Answer all the questions*

1. (a) Plot the vertical total and effective stresses and porewater pressure with depth for the soil profile shown in Figure.1 for seepage condition. A porewater pressure transducer installed at the top of the sand layer gives a pressure of 58.8 kPa. Assume that  $G_s = 2.7$  and neglect pore air pressure. (b) If a borehole were to penetrate the sand layer, how far would the water rise above the groundwater level?

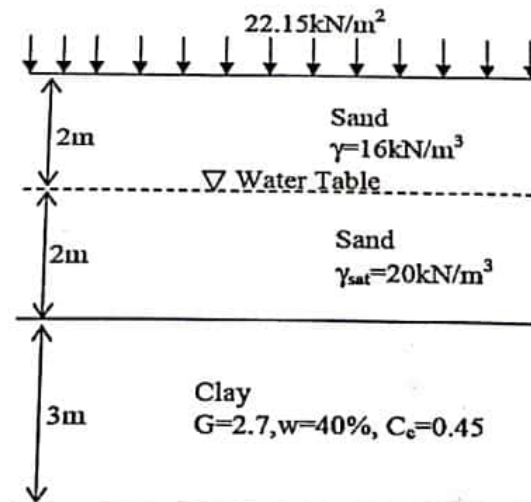
(15)



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2. A soil profile shown in the figure 2. Calculate the settlement for the 3m clay layer due to a surcharge of  $22.15 \text{ kN/m}^2$ .

(10)

**Figure 2**

3. A falling head permeability test is to be performed on a soil sample whose coefficient of permeability is estimated to be about  $2.185 \times 10^{-5} \text{ cm/s}$ . What diameter of the stand pipe should be used if the head is to drop from 27.5 cm to 20 cm in 5 minutes 30 seconds and if the cross sectional area and length of the



sample are  $15.5\text{cm}^2$  and  $8.5\text{cm}$  respectively? Will it take same time for the head to drop from  $37.5\text{ cm}$  to  $30.5\text{cm}$ ? (10)

4. A site consists of dense sand up to  $3.5\text{m}$  depth, normally consolidated clay from  $3.5$  to  $6.5\text{m}$  depth and stiff impervious rock below  $6.5\text{m}$  depth. The water table is  $1.5\text{m}$  below the ground level. The density of the sand is  $19.1\text{kN/m}^3$  above water table and  $21.52\text{kN/m}^3$  below it. The natural water content of the clay was observed as  $62\%$  and grain specific gravity is  $2.66$ . Take  $W_L = 77\%$ . Estimate the probable settlement if the ground level is raised by  $2.5\text{m}$  thick full of dense sand of density  $19\text{kN/m}^3$ . (10)
5. The secondary settlement in the fine grained soils are more rapid than the coarse. State True or False. Justify your answer technically. (2)
6. How will you determine coefficient of volume compressibility of soil from oedometer test? Derive using phase diagram. (3)