

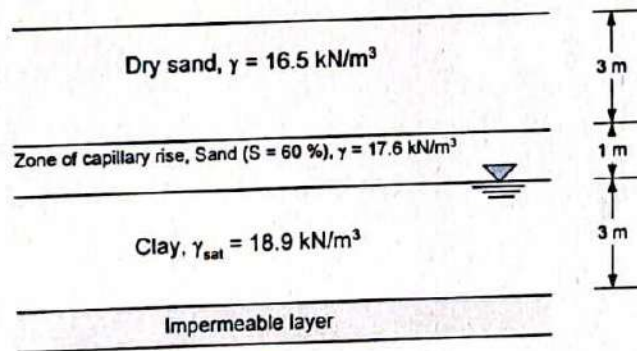
Mid-West University
Examinations Management Office
 End-Semester Examinations -2080

Bachelor level/ B.E. Hydropower/4th Semester
 Time: 3 hours
 Subject: Soli Mechanics (HE210/HE445)

Full Marks: 50
 Pass Marks: 25

- Attempt all the questions
- Figures in the margin indicate full marks.
- Assume suitable values, with a stipulation, if necessary.
- Candidates are required to answer the questions in their own words as far as possible.

1. Illustrate the importance of soil mechanics in the field of hydropower engineering. [2]
2. Define phase diagram. Discuss the engineering significance of phase system. A soil sample in its natural state has when fully saturated a water content a water content of 32.5%. Determine the void ratio, dry and total unit weights. Calculate the total weight of water required to saturate a soil mass of volume 10 m³. [5]
3. Write about USCS system of soil classification with its significance. What is the effect of compaction on engineering properties of soil? Write about compaction curve with its salient features including zero air void line? What are the factors affecting compaction of soil? [5]
4. For the soil profile shown in the figure, calculate and plot the variation of total stress (σ), pore water pressure (u), effective stress (σ'). Note the zone of capillary rise in the sand layer overlying clay. In this layer, average degree of saturation and moist unit weight are 60% and 17.6 kN/m³, respectively. [5]



5. Write down the properties of flownet along with its applications. Why piping failure occurs in dams? How can you minimize piping failure? Discuss about the specifications and use of filter media in dams. [5]
6. A monument weighing 15MN is erected on the ground surface. Considering the load as concentrated one, determine the vertical pressure directly under the monument at a depth of 8m below the ground surface. [4]
7. Differentiate between compaction and consolidation. A soil profile at a site for proposed office building consists of a layer of fine sand 10.4m thick above a layer of soft normally consolidated clay 2m thick. Below the soft clay is a deposit coarse sand. The ground water table was observed at 3m below ground level. The void ratio of sand is 0.76 and the water content of the clay is 43%. The building will impose a vertical stress increase of 140KPa at the middle of the clay layer. Estimate the primary consolidation settlement of the clay. Assume the soil above water table to be saturated. $C_c=0.3$ and $G_s=2.7$. [5]
8. Define shear strength of soil. How do you find shear strength of soil using Mohrs circle? In an unconfined compression test, a specimen of clay failed at an axial stress of 250KN/m². If failure angle was inclined at 50° to the horizontal, determine the parameters C and ϕ . [5]

9. Why slope stability analysis is required? Write the factors which pose impact on stability of slope? Write different types of slope failure and their preventive measures. [5]
10. Which method is used to determine permeability in case of fine-grained soils in laboratory? Derive the expression for it. What are the factors affecting permeability of soil? [5]
11. Write about [4]
- a) Clay Structure
 - b) Quick sand condition

THE END

~~Solical~~
Hydro soil