

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

MAKEUP EXAMINATION – APRIL (2018)

B.Tech. IV Semester

COURSE CODE: 10B11CE411

MAX. MARKS: 25

COURSE NAME: GEOTECHNICAL ENGINEERING

COURSE CREDITS: 04

MAX. TIME: 1.5 HRS

Note: All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means. Assume necessary data wherever required as per IS code.

1. An oven - dried sample of volume 250 c.c., weighs 430 g. If the specific gravity of solids is 2.70, what is the water content when the soil becomes fully saturated without any change in its volume? What will be the water content which will fully saturate the sample and also cause an increase in volume equal to 10% of the original dry volume? Use phase diagrams.

[2+2 = 4]
2. Differentiate between compaction and consolidation. What is the effect of compaction on permeability of soil?

[1.5+1.5 = 3]
3. A layer of silty soil of thickness 5 m lies below the ground surface at a particular site and below the silt layer lies a clay stratum. The ground water table is at a depth of 4 m below the ground surface. The following data are available for both silt and clay layers of soil.

Silt layer: $D_{10} = 0.018$ mm, $e = 0.7$ and $G_s = 2.7$

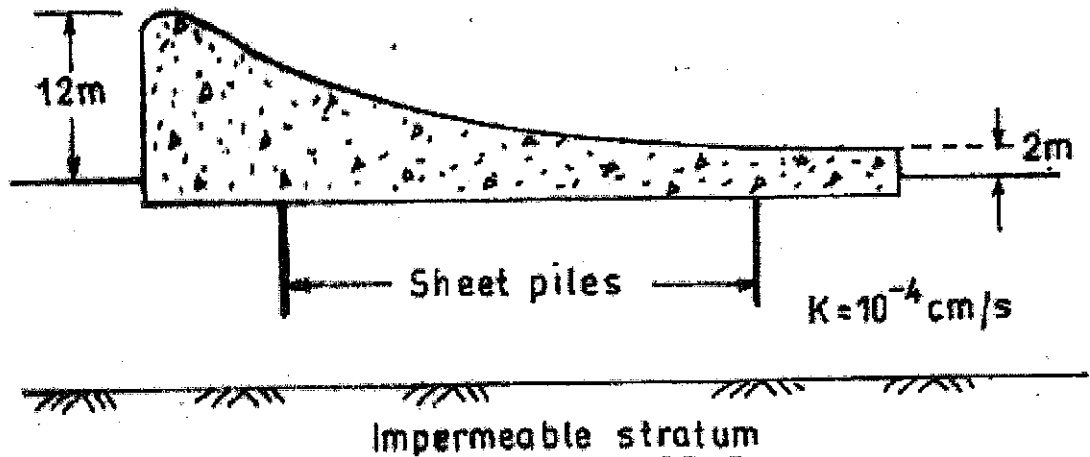
Clay layer: $e = 0.8$ and $G_s = 2.75$

Determine. (a) Height of capillary rise, (b) capillary pressure, (c) effective pressure at the ground surface, at GWT level, at bottom of silt layer and at depth of 6 m below ground level.

[1+1+3 = 5]
4. What is phreatic line? Describe with the help of a diagram, the procedure to draw phreatic line of an earthen dam with filter and derive the expression for discharge through body of the dam.

[1+4 = 5]

5. Given the flow situation shown in the figure.



- Is this a case of confined or unconfined flow?
- What are the boundary conditions for the flow situation depicted in the figure?
- A flownet drawn for this condition gives $n_x = 3$, $n_y = 30$. What is the quantity of flow per metre run occurring under the weir?
- The elementary square at the toe of the weir has dimensions of 0.6 m. What is the exit gradient?
- For what reservoir height would the exit gradient be equal to 1? What is the implication of condition to the safety of the weir?

[1+1+2+2+2 = 8]