

NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY

DEPARTMENT OF CIVIL AND WATER ENGINEERING

FACULTY OF INDUSTRIAL TECHNOLOGY

BACHELOR OF ENGINEERING (HONOURS) DEGREE

PART II SECOND SEMESTER EXAM. JUNE – 2010

GEOTECHNOLOGY TCW 3205

INSTRUCTIONS

Answer any four questions

Time : 3 hours

Total Marks: 100

QUESTION 1

- (a) Define the terms effective pressure and pore water pressure. **(2 marks)**
- (b) A layer of sand 4,5m deep overlies a thick bed of clay . The water table is 2m below the top of the sand . Above the water table , the sand has an average void ratio of 0,52 and an average degree of saturation of 0,37 . The clay has a water content of 42% . Calculate the total , effective and pore water pressures on a horizontal plane 9m below the ground surface and draw pressure distribution diagrams down to this level. Take the specific gravity for both the sand and clay as 2,65. **(23 marks)**

QUESTION 2

For the subsoil condition shown in fig. 2 , draw the total , neutral and effective stress diagrams upto a depth of 9m , neglecting capillary flow. **(25 marks)**

QUESTION 3

With the aid of Mohr's circle diagrams , explain what is meant by active and passive Rankine states in a $c - \phi$ soil with a horizontal surface . Obtain an expression for the intensity of active pressure exerted by such a soil at a depth behind a retaining wall with smooth , vertical back. The surface of the soil is horizontal and coincides with the top of the wall.

(25 marks)

QUESTION 4

(a) Calculate the total active thrust on a vertical wall 8m , retaining a sand of density 1700 kN/m^3 for which $\phi = 35^\circ$, The surface of the sand is horizontal and the water – table is below the bottom of the wall . (take $p_w = 10 \text{ kg/m}^3$, $\gamma_w = 10 \text{ kN/m}^3$) . **(6 marks)**

(b) Determine the thrust on the wall if the water – table rises to a level 2m below the surface of sand. The saturated density of $\gamma_{sat} = 2000 \text{ kg/m}^3$. Sketch the pressure distribution diagram.

(19 marks)

(25 marks)

QUESTION 5

For the given soil profile shown in fig. 5 , calculate the geo – static effective pressure at a depth of 12m.

(25 marks)

QUESTION 6

For an earth retaining wall shown in fig. 6 , sketch the earth pressure diagram under active state and find the total thrust per unit length of wall and its location . **(25 marks)**

Fig. 2

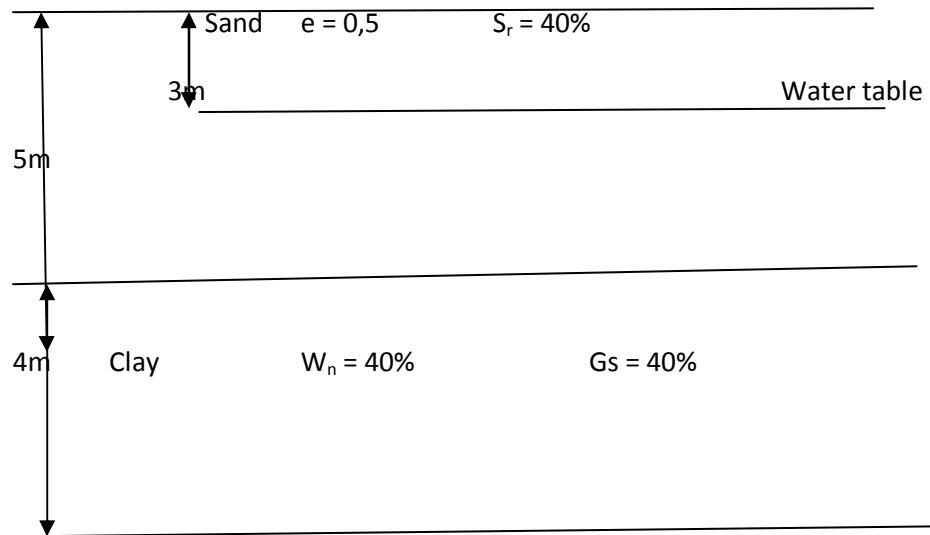


Fig. 5

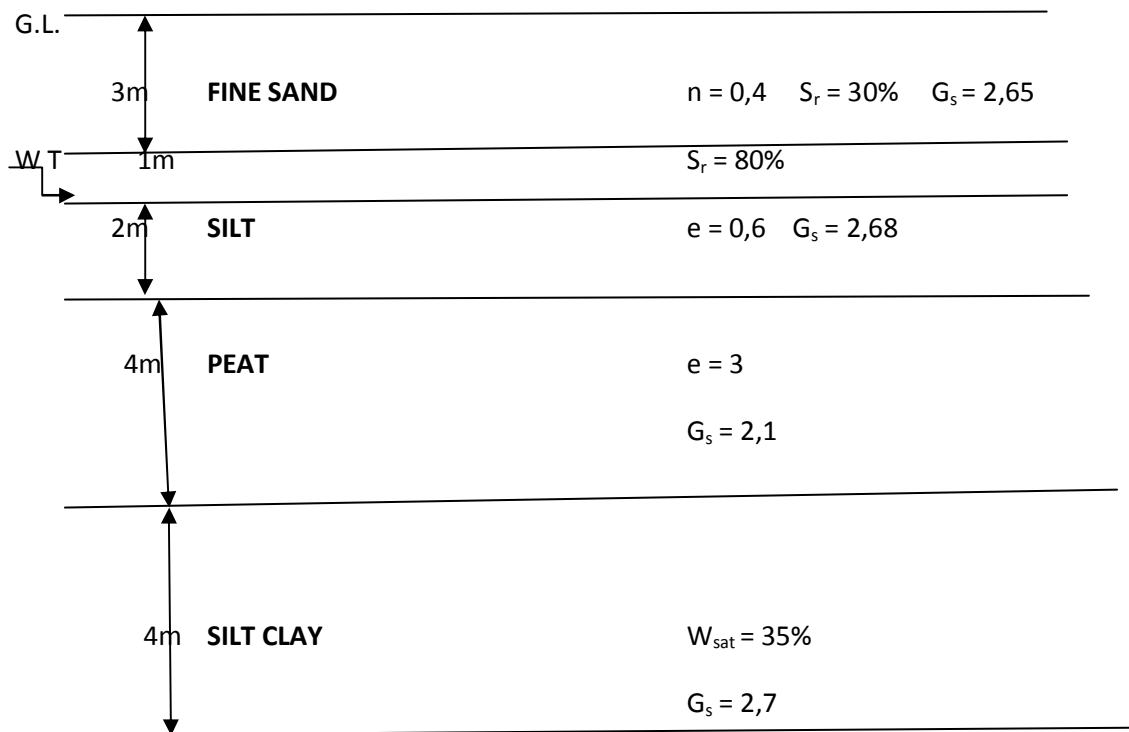


Fig. 6

