

KATIHAR ENGINEERING COLLEGE, KATIHAR

Code: 011615

B.Tech 6th semester Mid Term Exam

Soil and Rock Mechanics

Time: 2 hours

Full Marks: 20

Instructor: Rashid Mustafa

Instructions: Answer any five question in which question number 1 is compulsory

The marks are indicated in the right- hand margin

1. Choose and write the correct option

1x4= 04

(i) During a site reconnaissance survey, it was observed that 10 m height of soil is standing without any lateral support. What is the cohesive strength of soil with $\Phi = 0$ and $\gamma = 20 \text{ kN/m}^3$?

- (a) 100kPa (b) 50kPa (c) 25kPa (d) 200kPa

(ii) If an infinite slope of clay at a depth 5 m has mobilised cohesion of 1 t/m^2 and unit weight of 2 t/m^3 , then stability number will be

- (a) 0.1 (b) 0.2 (c) 0.3 (d) 0.4

(iii) In a direct shear test, the shear stress and normal stress on a dry sand sample at failure are 0.6 kg/cm^2 and 1 kg/cm^2 respectively. The angle of internal friction of the sand will be nearly

- (a) 25° (b) 31° (c) 37° (d) 43°

(iv) A clay soil specimen when tested in unconfined condition gave an unconfined compressive strength of 100 kN/m^2 . A specimen of the same clay with the same initial condition is subjected to a UU triaxial test under cell pressure of 100 kN/m^2 . The axial stress (in kN/m^2) at failure would be

- (a) 150 (b) 200 (c) 250 (d) 300

2. In an unconfined compression test, a soil sample fails at 160 kN/m^2 stress. The failure plane makes an angle of 50° with the horizontal. Calculate the values of cohesion and failure angle with the vertical.

04

3. A retaining wall 10 m height retains a cohesionless soil with an angle of internal friction 35° . The surface is level with the top of the wall. The unit weight of the top 3 m of the fill is 1.6 t/m^3 and that of the rest is 2.0 t/m^3 . Find the magnitude and point of application of the resultant active thrust. **04**

4. A smooth vertical wall 4 m high retain cohesive backfill with $c = 10 \text{ kN/m}^2$, $\phi = 0$ and $\gamma = 18 \text{ kN/m}^3$. Determine (i) the depth at which active pressure is zero, (ii) depth at which total active earth pressure is zero, (iii) depth of tension crack (iv) active pressure at the base of the wall. **04**

5. A direct shear box test on a specimen of sand gave the following observation:

Normal stress: 100 kN/m^2

Shearing stress: 46.6 kN/m^2

Determine the angle of internal friction and shear strength of soil at 5 m from the ground surface. Assume specific gravity of solid as 2.65 and void ratio as 0.7. The ground water table is at a depth of 2 m from ground surface. Also find change in shear strength, when water table rises up to the ground level. **04**

6. A cutting is to be made in clay for which the cohesion is 35 kN/m^2 and $\phi = 0$. The density of soil is 20 kN/m^3 . Find the maximum depth for cutting of side slope 1:1 if the factor of safety is to be 1.5. Take stability number for 1:1 slope and $\phi = 0$ is 0.17 **04**

7. A 5 m high masonry retaining wall has to retain a backfill of sandy soil having unit weight of 1.82 gm/cc and an angle of internal friction of 32° . The surface of the backfill is inclined at an angle of 10° to the horizontal. Determine the magnitude and point of application of the active thrust on the wall. **04**

----End of the question paper----

Note: Solution will be uploaded shortly on the college website www.keck.ac.in