KATIHAR ENGINEERING COLLEGE, KATIHAR
CIVIL ENGINEERING, 3rd Year (Semester-VI)

Subject: Soil and Rock Mechanics **Instructor: Rashid Mustafa**

Assignment 3

Q.1 An infinite slope is made of clay with the following properties: γ_t=18kN/m^3, γ'= 9 kN/m^3, c$'$= 25 kN/m^2, ϕ'= 28^0. If the slope has an inclination of 35^0 and height equal to 12 m, determine the stability of the slope when (a) the slope is submerged, and (b) there is seepagr parallel to slope.

Q.2 A slope of 35^0 inclination and 6 m vertical height is to be made in a purely cohesive soil having a unit weight of 1.85 t/m^3 and a cohesion of 6 t/m^2. Determine the factor of safety of the slope against sliding failure.

Q.3 Discuss the friction circle method for the stability analysis of slopes. Can this method be used for purely cohesive soil?

Q.4 For c-ϕ soil of infinite extent, prove that the expression of critical height of the soil for which FOS is unity, is

$$H = \frac{c}{\gamma \cos^2\beta(\tan\phi - \tan\beta)}$$

All the notations used carry their usual meanings.

Q.5 An embankment is to be made of a soil which has the following shear strength parameters under the existing conditions:

$$c' = 30 \text{ kN/m}^2,\ \phi' = 15^0$$

If it is assumed that different margins of safety are available for cohesion component and friction component of shearing strength and the mobilised values of cohesion and friction are c_m = 22 kN/m^2, $\phi_m = 12^0$, what is the factor of safety with respect to (a) cohesion, and (b) friction? If the average value of normal effective stress on the failure surface is 120 kN/m^2 what is the value of (a) true factor of safety F_s, (b) F_ϕ when F_c= 1 and (c) F_ϕ when F_c = 1?

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